Construction Methods and Equipment

McGraw-Hill Publishing Company, Inc.

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October, 1938

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ERECTING 718-Ft. SPIRE to serve as main antenna for radio station KDKA

In This Issue — A 16-page illustrated section on

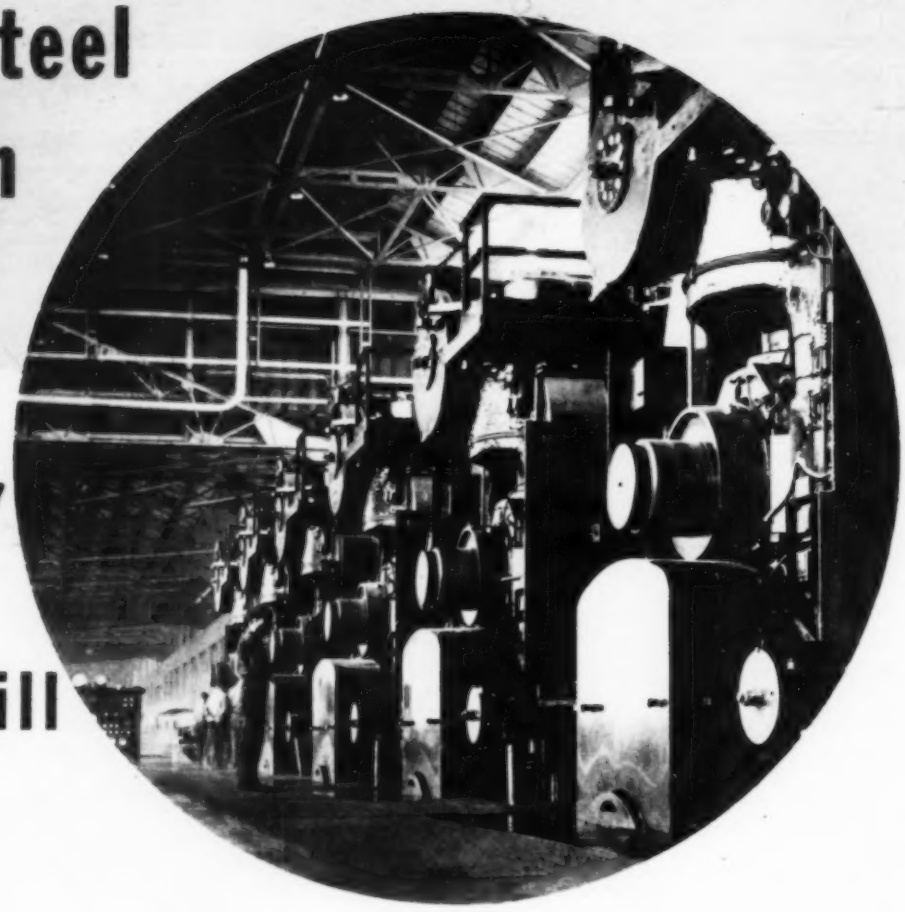
PUBLIC RELATIONS FOR INDUSTRY

with special reference to construction

Inland Completes Flat Rolled Steel Construction Program...

with

NEW 44" Continuous Mill



For more than ten years Inland has been designing and building an ideal modern plant for the production of all kinds of sheets and strip.

Ten years ago flat rolled steel accounted for about 25% of the steel industry's total production. Today, with increased uses in the building field, including the rapidly growing air conditioning market, as well as in many manufacturing industries, sheets and strip total about 50% of the total amount of steel tonnage produced.

Inland was preparing, not only for this growth of tonnage, but also for the many more specialized requirements which sheets today must meet.

New furnaces and laboratories were installed. An entire galvanizing plant was scrapped and replaced with new and improved equipment. One of the country's first wide continuous rolling mills was installed in 1932. The climax of this modernizing program has been reached this year with the installation of the world's highest speed mills, capable of producing a mile of steel a yard wide in 2½ minutes.

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

CURRENT JOBS

. . . . and Who's Doing Them

DAMS
WATERWORKS
AND SEWERS

Low bidder for earth flood control dam at Fort Supply, Okla., was **Morrison-Knudsen Co.,** and **W. E. Cole Co.,** of Boise, Idaho, with price of $1,544,375. **Morrison-Knudsen Co.,** of Boise, Idaho, also was successful bidder for Roza dam near Yakima, Washington, to cost $826,860.

Test borings for reservoir tanks at Pittsburgh, Pa., are being put down by **Sprague & Henwood,** of Pittsburgh, at cost of $635,000. General contract for improving waterworks at Evansville, Ind., went to **A. G. Ryan & Sons,** of Evansville, for $384,967. New pumping station and water mains in Chicago, will be installed by **Allied Bridge & Construction Co.,** of Chicago, for $493,508.

Sewer construction in Brooklyn, N. Y., to cost $607,211, was bid in by **Tomasetti Contracting Co.,** of Brooklyn. **New Haven Road Construction Co., Inc.,** is building a $220,450 sewage disposal plant in New Haven, Conn. Sewer extension at Naval Operating Base, San Diego, Calif., is under way at cost of $168,330, by **Case Construction Co.,** of San Pedro, Calif.

BRIDGES

Low bidder for three span 7,400 ft. reinforced concrete toll bridge over Mississippi River near St. Louis, Mo., was **G. L. Tarlton,** of St. Louis, with price of $5,383,109. Viaduct at Hoboken, N. J., will be built for $558,345, by **G. M. Brewster & Son,** of New York City. For north approach to Highland Park bridge near Pittsburgh, Pa., $350,121 contract was awarded to **J. F. Casey Co.,** of Aspinwall, Pa. Grade crossing elimination in Long Island City, N. Y., is under way at cost of $426,903, by **Borough Asphalt & Sprague Construction Co.,** of Arverne, N. Y. **MacDonald & Kahn, Ltd.,** of San Francisco, bid in for $747,000 High St. bridge, at Oakland, Calif. At Miami, Fla., $323,412 bridge will be built by **T. A. Loving & Co.,** of Goldsboro, N. C.

MISCELLANEOUS

Subway contract in New York City, amounting to $4,017,091, went to **George H. Flinn Corp.** of New York City. Another New York City subway contract, amounting to $1,931,000, was bid in by **Rusciano & Sons Corp.,** of New York City. For airplane hangars at Fort Lewis, Wash., costing $790,888, are being built by **Sound Construction & Engineering Co.,** of Seattle, Wash. A wharf at Mobile, Ala., is under construction by **Raymond Concrete Pile Co.,** of New York City, at cost of $346,351. Dredging at Portsmouth, Va., is being done by **McLean Contracting Co.,** of Baltimore, Md., for $1,427,000. **Arundel Corp.,** of Brooklyn, N. Y., obtained $941,358 dredging contract for New York harbor.

BUILDINGS

Public — A Needle Trades high school in Brooklyn, N. Y., to cost $1,317,240, will be built by **J. Weinstein & Rubin Building Corp.,** of New York City. In Los Angeles, Calif., **Sarver & Zoss,** of Los Angeles, will build a $1,692,000 post office annex. Successful bidder for marine hospital, in Boston, Mass., was **J. Bowen Co.,** of Boston, with price of $1,671,600. Apartment house for Naval Academy at Annapolis, Md., will be built by **Consolidated Engineers Co., Inc.,** of Boston, for $1,100,825. A $1,446,000 contract for hospital units at Newtown, Conn., went to **F. H. McGraw Co.,** of Hartford, Conn.

Commercial—A $3,600,000 apartment at 86th St. & Riverside Drive, New York City, will be built by **Samson Rosenblatt,** of New York City. Housing project to cost $3,000,000, at Port Washington, N. Y., has been started by **Williams-Harter Corp.,** of Port Washington. In Queens Village, N. Y., **Schuettinger & Oehler,** are building 130 homes at cost of $1,175,000. At Birmingham, Ala., brick buildings for Redmont Village, are under construction by **B. R. Jackson, Inc.,** of Silver Springs, Md., at cost of $750,000.

Industrial — In Syracuse, N. Y., **The Austin Co.,** of Cleveland, Ohio, is building a $2,500,000 soda plant for Solvay Process Co. A $1,000,000 oil refinery contract at Wellsville, N. Y., went to **Lumus Co.,** of New York City. Contract for $1,000,000 warehouse in Washington, D. C., was awarded to **Turner Construction Co.,** of New York City.

Construction Methods and Equipment

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H. W. CLARKE, Vice-President

OCTOBER, 1938

ROBERT K. TOMLIN, Editor
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Editorial Staff: Vincent B. Smith, Paul Wooton (Washington), Nelle Fitzgerald

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The "How" of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

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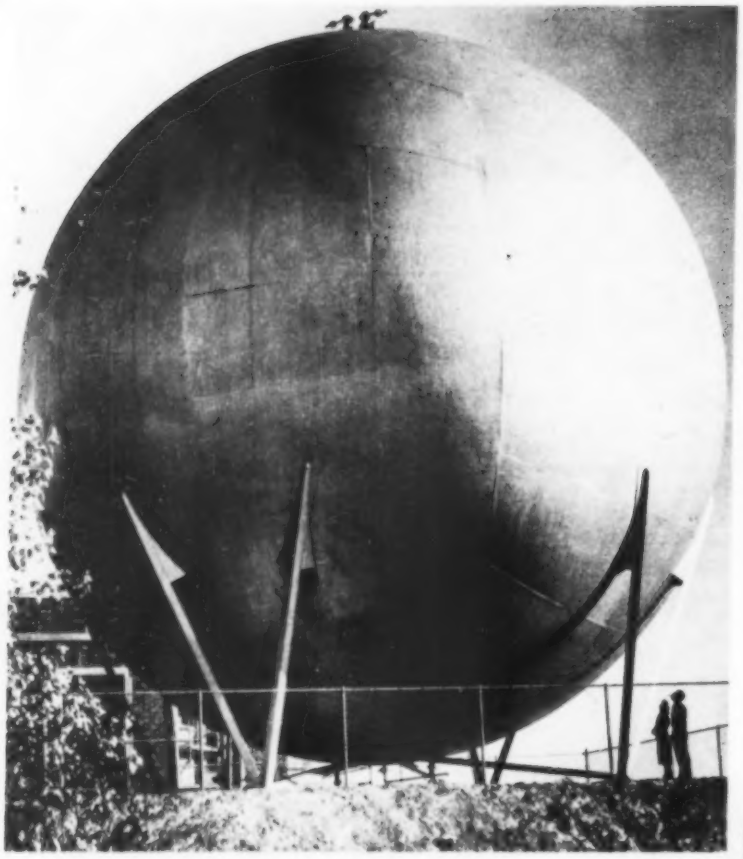

LIKE A BUBBLE floating on sludge-digestion gas line at southerly sewage disposal plant, Cleveland, Ohio, 57½-ft.-diameter steel-plate sphere erected by Chicago Bridge & Iron Co. is designed to have uniform stress in all parts. Electrically arc-welded throughout with Fleetweld electrode, sphere stores 200,000 cu.ft. of excess gas at 29-lb. pressure.

2 MI. OF CONVEYOR BELT for unit installation at Grand Coulee dam is shipped by Goodyear Tire & Rubber Co. in eight separate 10-ton rolls about 10 ft. in diameter for vulcanizing into continuous 9,700-ft. belt at site, where 48-in. conveyor moving 450 ft. per minute will deliver 2,000 tons per hour of coarse aggregate to plant of Consolidated Builders, Inc., contractor for upper portion of high dam.

JOB ODDITIES

A MONTHLY PAGE OF

Unusual Features of Construction

"Not me! I want one foot on the ground!"

MOVING CAMP (left) at Yosemite National Park, Calif., Caterpillar diesel tractor of Yosemite Park & Curry Co. hauls cabins on trailer 1¼ mi. from Government Center to maintenance yard.

'DATED' CONCRETE

PLACED AT 45° IN OCTOBER, 1927—'INCOR' CONCRETE SOUND AS A BELL TODAY

YOU'VE heard about 'Dated' Coffee — good way to tell how fresh it is. Now a word about 'Dated' Concrete — a way to tell *how good* the cement is.

Take this Howell Avenue Bridge (below) in Tippecanoe, Milwaukee suburb. Concreted with 'Incor' 24-Hour Cement just 11 YEARS AGO this month. Air-temperature, 45 degrees. Yes, 'Incor' saved time, and cut heat-protection cost. But the big point is, it made first-class, long-lasting concrete. Witness the fact that *this slab is good as new today, after 11 years service.* Typical of 'Incor' performance under hard service and difficult exposure conditions, in all kinds of work, the country over.

Long-time service is your best assurance. When high early strength and faster job curing save money, use 'Incor'*. Otherwise, use Lone Star Cement, quality standard for over a quarter century. Write for copy of "Cold-Weather Concreting." Lone Star Cement Corporation, Room 2270, 342 Madison Avenue, New York. *Reg. U. S. Pat. Off.

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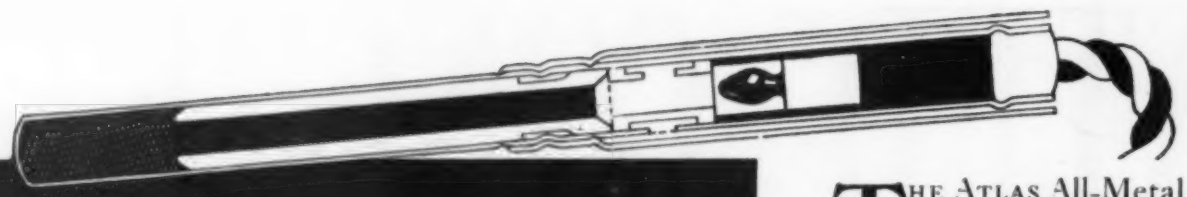

The *First* all-metal Delay Electric Blasting Cap in the field now offers *Still Greater Safety* with the introduction of

ATLAS MANASITE

Another "ATLAS FIRST"

BLASTING CAPS
ELECTRIC BLASTING CAPS

ALL-METAL DELAY
ELECTRIC BLASTING CAPS

THE ATLAS All-Metal Delay Electric Blasting Cap was the first of its kind on the market. It set new standards of accuracy. Blasters have long regarded this cap as the criterion of dependable performance and of split-second firing regularity.

Now, this famous cap offers an added advantage—the greater safety of Atlas Manasite.

Atlas has developed a patented method of using hexanitromannite as an initiating compound. This has never been used before. It means a substantial reduction in sensitivity to impact and friction—a material increase in the margin of safety because it lessens the possibility of accident through inadvertent mishandling.

Greater safety has been attained without sacrificing detonating efficiency or firing regularity. The new Atlas Manasite Delay Electric Blasting Cap costs no more than the old type. It requires only the usual methods of storage and application.

Extensive use of Atlas Manasite Detonators has completely proved the value of this new development, now available in Atlas Delay Electric Blasting Caps. Ask the Atlas representative to tell you more about it.

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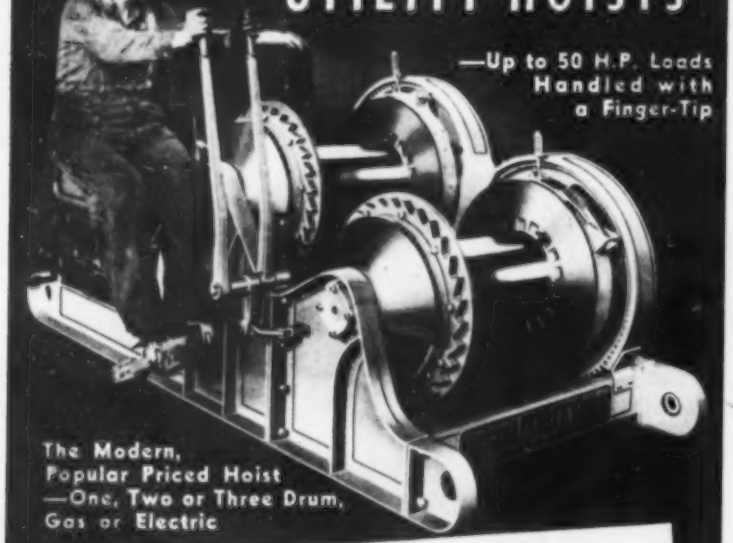

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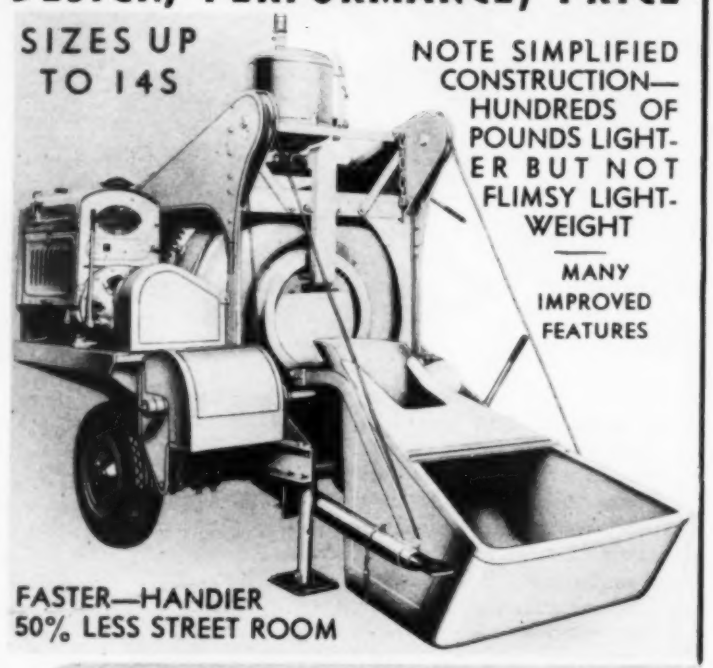
MANY IMPROVED FEATURES



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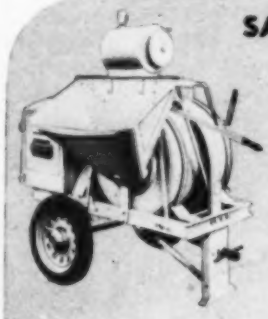
50% LESS STREET ROOM



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JAEGER "UTILITY" MIXER with MEASURING BATCH HOPPER

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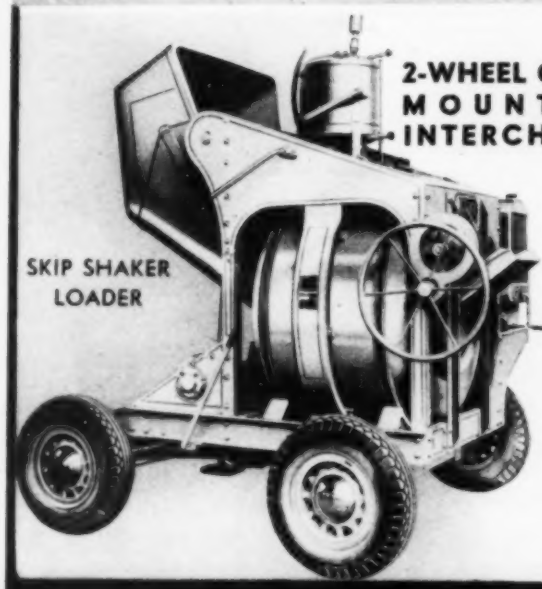

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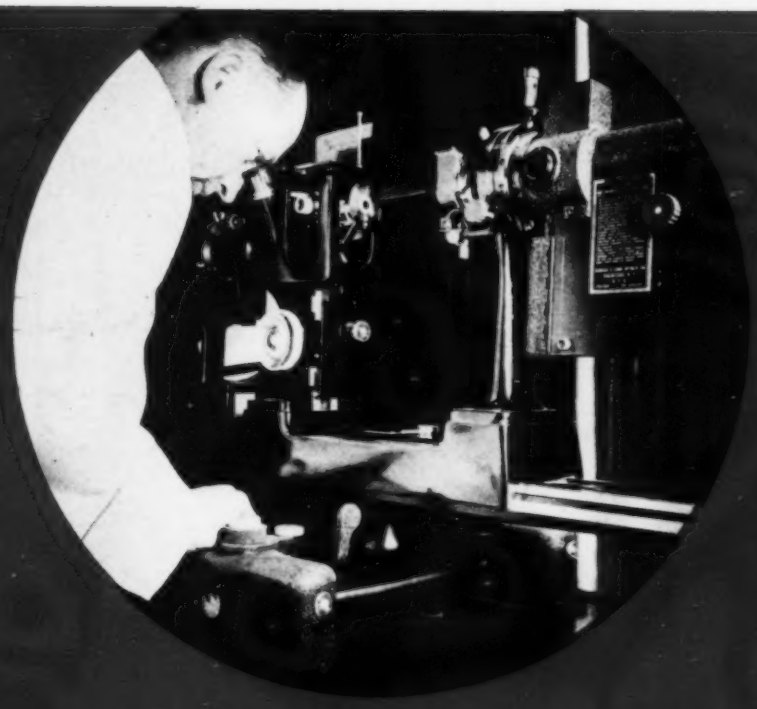

THROUGH THE MICROSCOPE

HE SEES WHAT IT REALLY IS SO KNOWS WHAT IT WILL DO

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It is still the privilege of the progressive manufacturer to build rope life into his product beyond official specifications.

High fatigue resistance with resulting long rope life is the common denominator of quality of every type of wire rope. The ideal balanced crystalline structure producing high fatigue value of each kind of rope steel is positively identifiable by competent microscopic examination. The continuous microscopic checkings in Wickwire Spencer Laboratories, the direction of processing resulting from these studies, impart the long life characteristic of Wickwire Rope.

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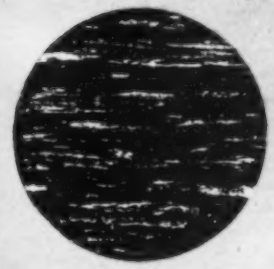
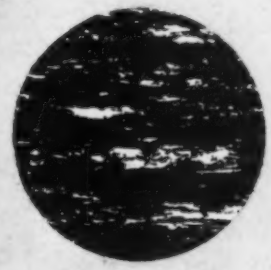
TRACTION STEEL

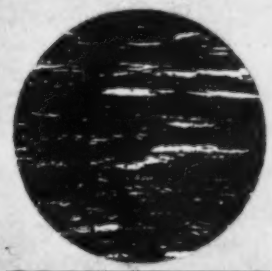


CAST STEEL

MILD PLOW STEEL



PLOW STEEL



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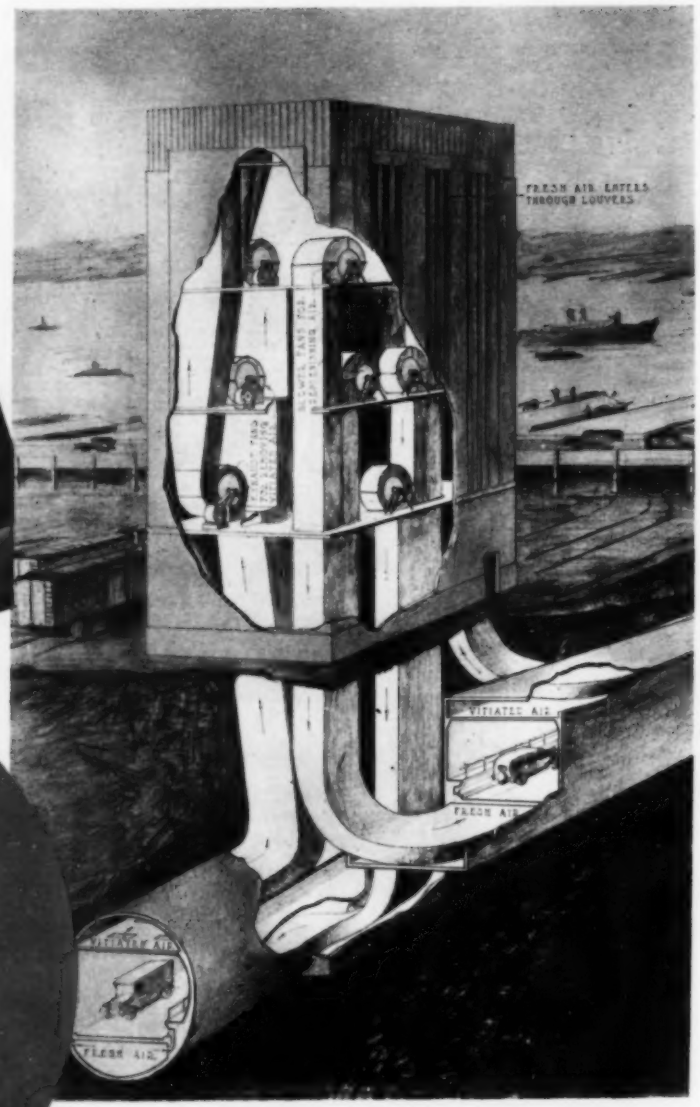

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INTERNATIONAL HARVESTER COMPANY
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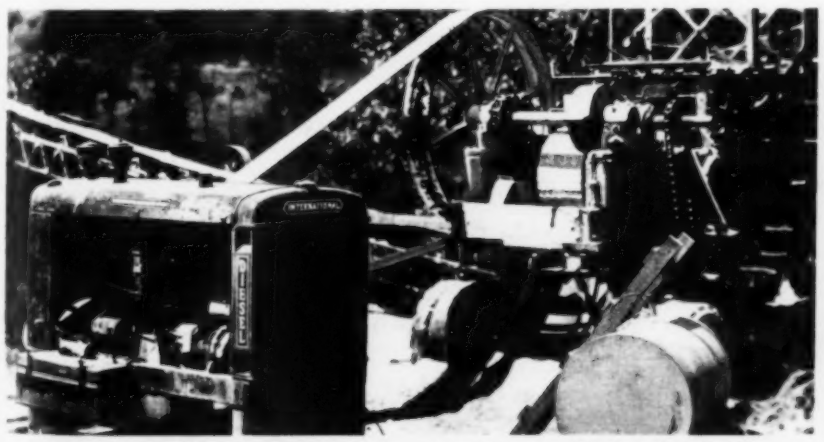

This International PD-80 Diesel Power Unit saves $5.30 a day for the owner of this rock crusher compared to the power it replaced. It has also increased production 75 to 100 cubic yards a day.

The International ID-40 Diesel Tractor provides the economy of the International Diesel engine where a wheel-type tractor is wanted.

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Dr. P. Phillips

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EXECUTIVE OFFICES
ORLANDO, FLA.

May 27, 1938.

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The need for fuels and lubricants for our machinery is almost as varied. Because we have our own packing houses, our own fertilizer plant, our own insecticide plant, our own canneries, our own cattle and poultry feed making plant, and our own by-products plant, we must demand highly specialized lubrication service to meet the trying conditions which our activities impose. Never once has Texaco faltered in giving us the proper material for the job at hand. Your products have stood the test of time, of hard use, of efficiency, and of economy.

It isn't necessary to go into detailed figures to let you know how satisfied we are with Texaco products. We have tested them against others; that's why we use them in every branch of our industry.

Yours very truly,
Howard Phillips
Howard Phillips

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Dr. P. Phillips, the world's largest individual grower of oranges, grapefruit, and tangerines, operating 5000 acres of groves, canning and packing plants, and transport equipment near Orlando, Florida. This property is Texaco lubricated throughout.

Dr. Phillips' fleet of tractors, trailers, trucking and automotive equipment. Texaco Motor Oils, Texaco Marfak, Texaco Thuban, and Texaco Fire-Chief Gasoline are used on these exclusively.

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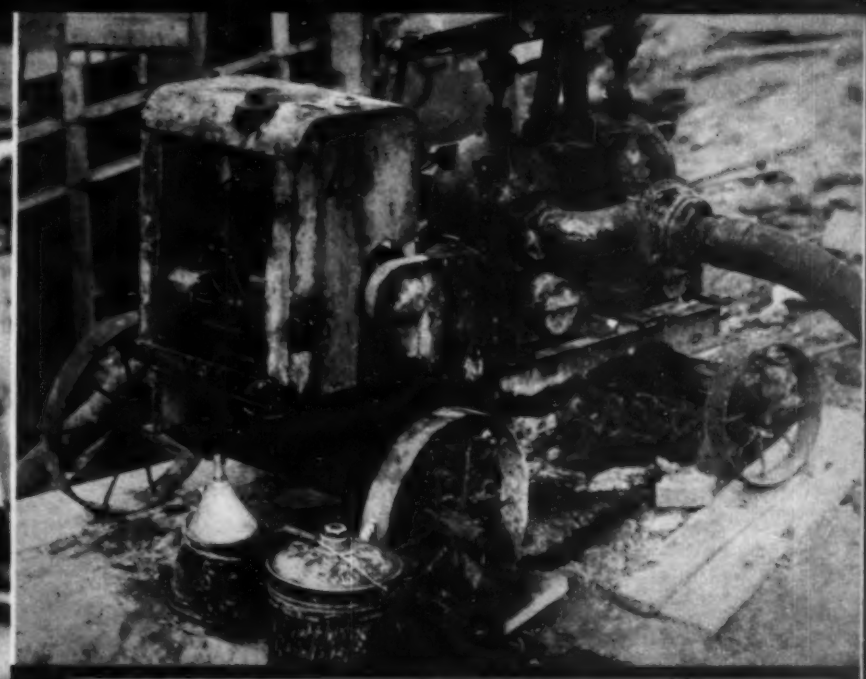
TEXACO

TEXACO *MOTOR OIL*



(Above) A grizzled old veteran of many a pumping job is this 10 year old Novo double, force diaphragm pump. Weeks and months of continuous operation on one job after another, handling water laden with debris. It's the old reliable, fool-proof, contractor's friend. Here, it is dewatering excavation for footings on river retaining wall.

(Left) Ask the Boss, he knows. Here is Keith Granger of the Dorr D. Granger Construction Co. operating the Novo NH, single drum hoist used on the new Lansing, Michigan, mart and produce market. "That hoist can take it," said Mr. Granger. "We bounce it around from one job to another, and it's always ready to go."

Send for information on the complete line of Novo Hoists, gasoline, electric, or Diesel powered.

How They Did It With NOVO

(In oval) Pumping over a mile with a discharge head of 40' and a suction lift of 10', this Novo Pressure Pump (Model DU) is delivering approximately 3,000 GPH for drilling operations at Chase, Kansas. Pump owned by the Harbor Drilling Co. Novo has the most complete line of pressure pumps offered to the contractors. — Send for literature.

(Left) When the pumping got too heavy for other pumps to handle they rushed in this Novo 6" Self-Primer to dewater the coffer dam on this highway bridge job. The Novo pulled down the 18' of water so that pouring of concrete could start. Contractors were Frank & Stiehl of East Lansing, Michigan.

Send for literature on Novo equipment. There is a Novo Distributor in your locality ready to serve you.

NOVO

NOVO ENGINE COMPANY

214 Porter St., Lansing, Mich.

"CATERPILLAR" DIESELS GET AROUND!

NEW ZEALAND

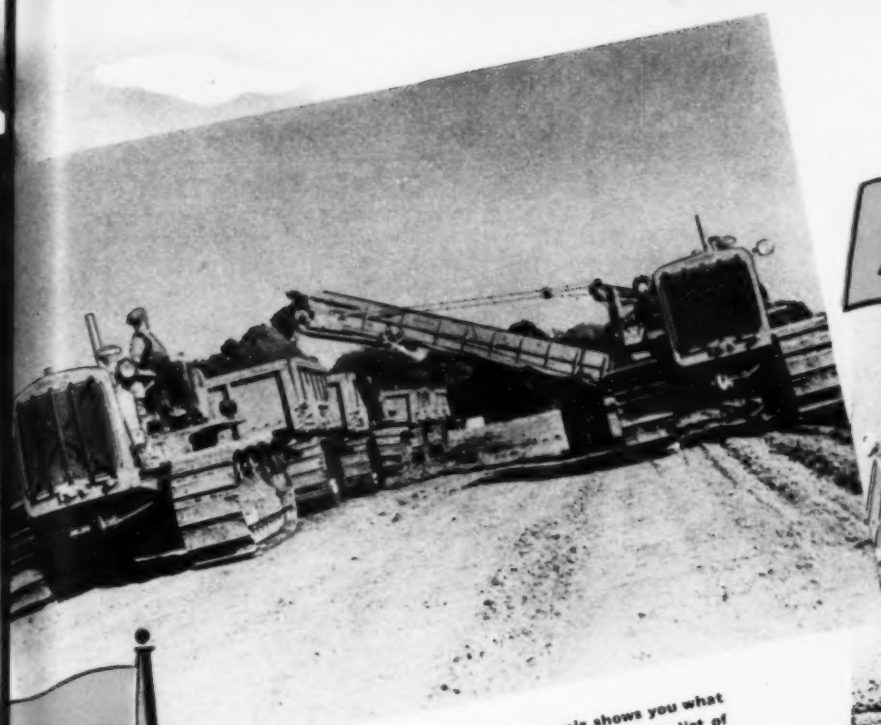
▲ "Caterpillar" Diesel equipment gets the call when there's difficult work "down under." Here is a D7 Tractor, with a LaPlant-Choate roadbuilder, chosen for its sure-footed traction to work in some very loose and treacherous beach-shingle. The result of this job will be a big, new outlet to the sea—furnishing drainage for the Timaru Municipal Airport. Further evidence of New Zealand's respect for this power is in the Speeder dragline in the background. It is driven by a "Caterpillar" Diesel Engine!

HAWAII

▲ Realigning and regrading the Koko Head Road in Hawaii—named for the volcanic mountain in the background—was a 100% "Caterpillar"-powered job! Here is one piece of the equipment . . . a Sullivan WK-80 315-cu.-ft. compressor driven by a "Caterpillar" Diesel D13000 Engine!

IRAQ

▲ It's "Caterpillar" Diesel power in Iraq too! This is a D7 Tractor and a No. 66 "Caterpillar" Grader helping build an elevated sub-grade for a desert railroad. In this picture, the machines are trimming a borrow-pit to get extra dirt for two more casts with a "Caterpillar" Elevating Grader and another D7 Tractor. "Caterpillar" dependability is appreciated in remote places like this!



▲ The construction of the London Reservoir shows you what John Bull thinks of "Caterpillar" Diesels! Look at this list of equipment used: 28 "Caterpillar" Diesel D8 Tractors. 4 "Caterpillar" Elevating Graders. 2 "Caterpillar" Blade Graders. 1 "Caterpillar" Diesel D8, with LaPlant-Choate roadbuilder. 1 "Caterpillar" Diesel D8, with LeTourneau bulldozer. A total of 36 "Caterpillar" Diesel units! The wagons, shown here, are side-dump Athays—a few of the twenty-two on the job.

They have flood-control in South America too . . . and, like the United States, use "Caterpillar" Diesel equipment in its construction! Here is a D8 Tractor, with carryall scraper, working on levees along the Rio Sao Francisco, at Santa Cruz—near Rio de Janeiro. Two outfits like this are handling loose top-soil . . . light, sandy loam . . . and moist, sticky clay. Brazilians appreciate the power, traction, dependability and fuel-economy of "Caterpillar" Diesels! ▼

IF YOU were to leave this country—and travel the world's remote regions—you'd come home agreeing with us that "*Caterpillar*" *Diesels get around!* For you'd see them in China, Alaska, South America, Siberia, Africa, India, Australia, all over Europe, on islands far from the mainland . . . wherever there is civilized man; wherever power is needed!

On these two pages are a few photographs selected at random as they arrived from different parts of the globe. They show how men with problems similar to yours, and similar to each other's—but speaking languages different from each other, and different from ours—have one thing in common. They all agree on the versatility . . . efficiency . . . long life . . . low maintenance . . . and fuel-economy of this modern power from Peoria, Illinois, U. S. A.!

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR DIESEL POWER

REG. U.S. PAT. OFF.

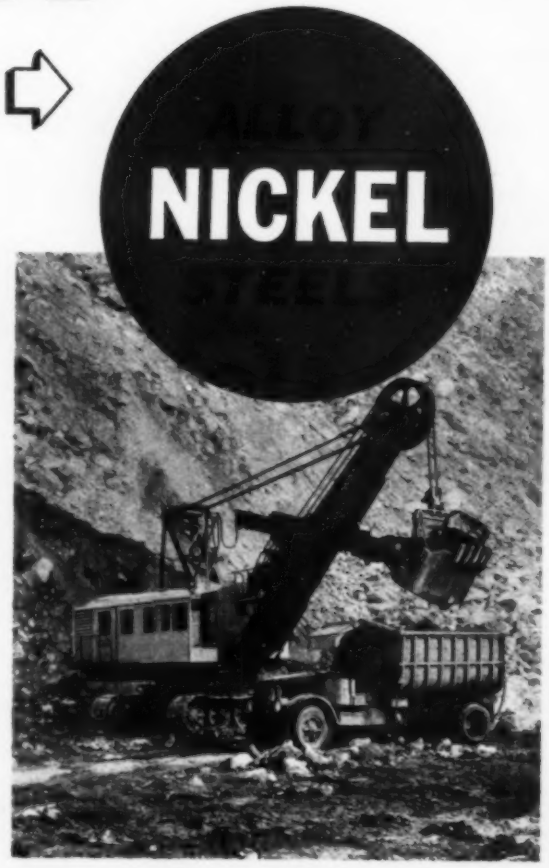
DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

THE PUNISHMENT OF BIG-YARDAGE PACE

With every bite of its dipper, a big shovel fights shock load and stress when digging in rock or ore. From crawler tread mountings, up through main and swing machinery to boom and dipper handles, Bucyrus-Erie Co., South Milwaukee, makes liberal use of strong, tough, wear-resisting Nickel alloy steels.

Eliminating barnacle bulk of dead weight, the high strength/weight ratio of Nickel alloy steels enables Bucyrus-Erie shovels to stand the punishment of a steady, big-yardage digging pace that cuts down tonnage costs.

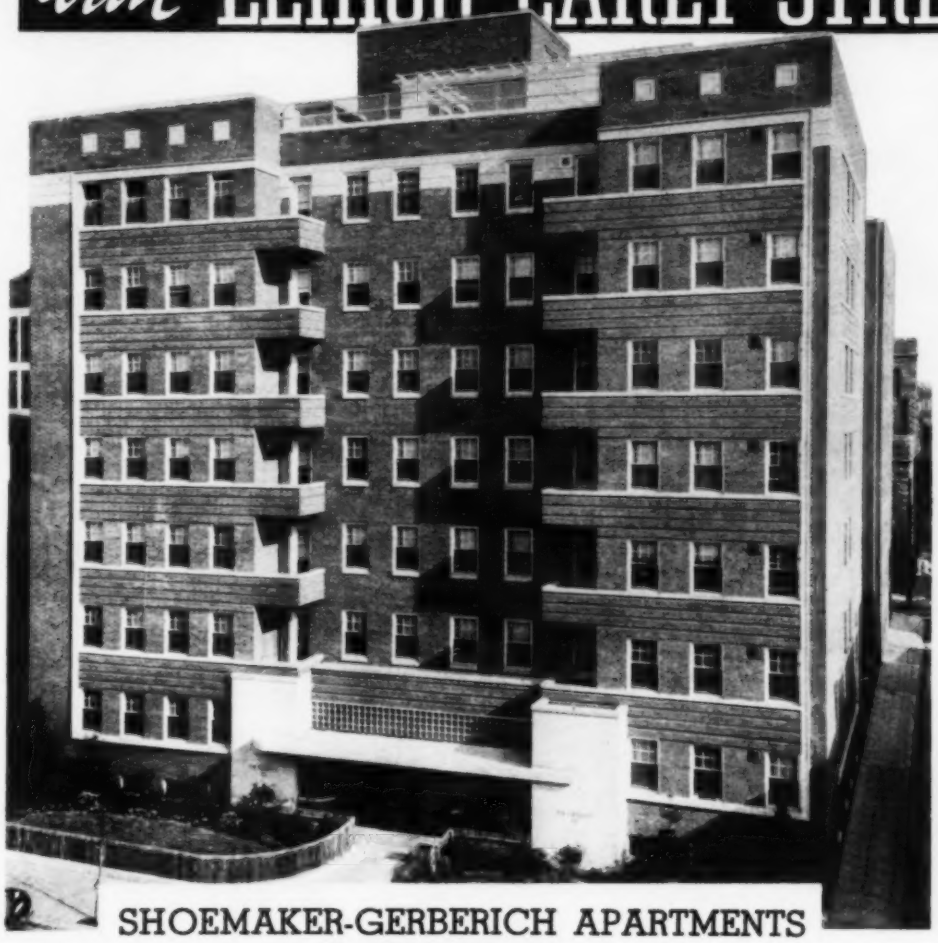
Bucyrus-Erie engineers developed special Nickel alloy steels, somewhat similar to SAE 3135, which are given special heat treatments to impart the physical properties necessary for a highspeed digging cycle—and trouble-free performance in the field. Hold operating costs at rock bottom. For your hardest jobs, use tougher Nickel alloy steels.



THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

Offset slow-curing *in cold weather*

with LEHIGH EARLY STRENGTH CEMENT



SHOEMAKER-GERBERICH APARTMENTS
Harrisburg, Pennsylvania
Contractor: S. W. Shoemaker & Sons, Harrisburg, Pa.
Architect: William Lynch Murray, Harrisburg, Pa.
Engineer: Alphonse Treo, Harrisburg, Pa.

Last fall after foundations were completed with normal portland cement concrete, approaching winter and the necessity for maximum construction speed and economy caused the contractor to change to Lehigh Early Strength Cement. Pouring continued at all temperatures to completion of concrete on January 14. Aggregates and water were heated but protection after placing was minimum. Lehigh Early Strength Cement was also used in the brick mortar as a frost safeguard. The contractor reports effective savings in heat protection, form costs and job overhead. Shortened construction time enabled completion ready for occupancy by the middle of March.

THREE to five times faster curing than normal portland cement at the same temperature. When nights are cool and winter coming, concrete construction can be speeded to completion to save heavy expenses of heat protection and costly delays due to bad weather. Even in severe winter weather, records show about two-thirds saving in heat protection costs. Because of quick re-use, form costs are minimum—job overhead cost reduction corresponds with shortened construction time. Save time and money by getting quick service concrete with Lehigh Early Strength Cement. It makes better, denser concrete in a fraction of the usual time. Special bulletin on Cold Weather Concrete will be sent on request.

LEHIGH PORTLAND CEMENT COMPANY

Allentown, Pa. Chicago, Ill. Spokane, Wash.

VETERANS OF *Many* PROFITS

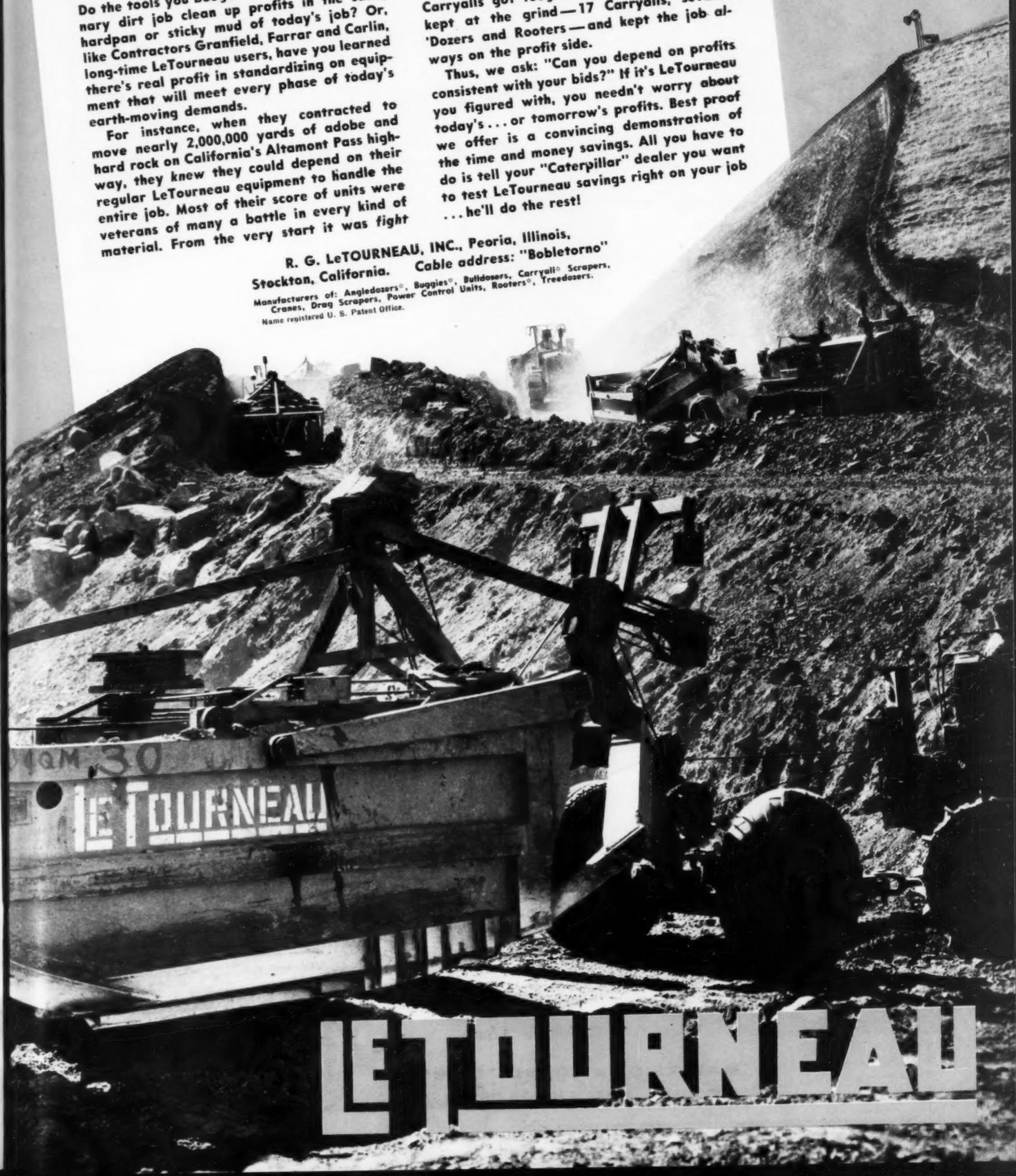
Do the tools you bought for yesterday's ordinary dirt job clean up profits in the sand, hardpan or sticky mud of today's job? Or, like Contractors Granfield, Farrar and Carlin, long-time LeTourneau users, have you learned there's real profit in standardizing on equipment that will meet every phase of today's earth-moving demands.

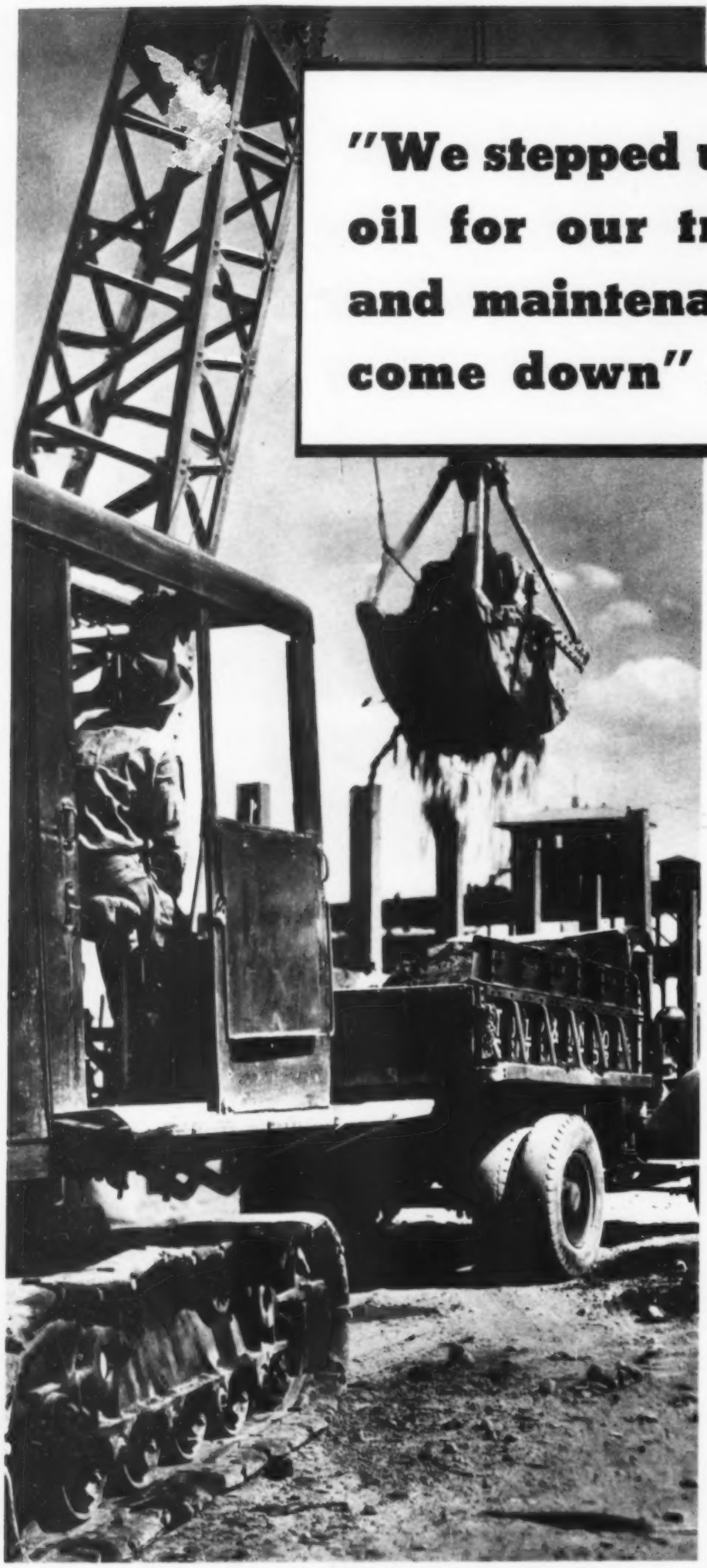
For instance, when they contracted to move nearly 2,000,000 yards of adobe and hard rock on California's Altamont Pass highway, they knew they could depend on their regular LeTourneau equipment to handle the entire job. Most of their score of units were veterans of many a battle in every kind of material. From the very start it was fight every inch of the way. No matter how steep the grades, or how tough the digging, the Carryalls got tougher. Day after day, they kept at the grind—17 Carryalls, several 'Dozers and Rooters—and kept the job always on the profit side.

Thus, we ask: "Can you depend on profits consistent with your bids?" If it's LeTourneau you figured with, you needn't worry about today's . . . or tomorrow's profits. Best proof we offer is a convincing demonstration of the time and money savings. All you have to do is tell your "Caterpillar" dealer you want to test LeTourneau savings right on your job . . . he'll do the rest!

R. G. LeTOURNEAU, INC., Peoria, Illinois,
Stockton, California. Cable address: "Bobletorno"

Manufacturers of: Angledozers°, Buggies°, Bulldozers, Carryall° Scrapers, Cranes, Drag Scrapers, Power Control Units, Rooters°, Treedozers.
Name registered U. S. Patent Office.





"We stepped up to *Gulfpride* oil for our truck fleet . . . . and maintenance costs have come down" . . . . *says this contractor*

You can insure uninterrupted service from your equipment by standardizing on **GULF QUALITY LUBRICANTS**

"WITH Gulfpride Oil, we have enjoyed uninterrupted service from our newest fleet of trucks. And Gulfpride has proved its ability to furnish better results on all of our other equipment, too," says this contractor.

Here is another in the long list of contractors who are finding it more economical to pay a few cents more per gallon for *quality* lubricants. Better lubrication with Gulf's higher quality oils relieves them of the annoyance of interrupted operations for repairs and adjustments. And it saves them money by keeping maintenance costs at lower levels.

Your equipment may be operating in a satisfactory manner, but we would like to suggest that when the Gulf engineer calls, you discuss with him the possibility of further improving the lubrication of each piece of equipment you are using. He is a thoroughly trained lubrication engineer, accustomed to working with operating men, and his suggestions may be of real value to you. So why not take advantage of this cooperative service at your first opportunity?

Gulf Oil Corporation
Gulf Refining Company
GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

MAKERS OF A COMPLETE LINE OF FUEL AND FURNACE OILS

FAST • FOOLPROOF • EASY TO OPERATE

A-W No. 11 Hydraulic Control Blade Grader, owned by Hendricks Cartage Co., Blue Island, Ill., back sloping 35,000 yards of material.

Hydraulic Power Does the Hard Work . . . No Fatiguing Muscular Effort to Reduce Operator's Efficiency.

A combination of time-saving, cost-reducing features found in no other road grader enables A-W Hydraulically Controlled Blade Graders to produce top performance records on grading, ditching, bank cutting, maintenance and scarifying work. Outstanding among these features are:

(1) ***Hydraulic Power Controls***—The fastest, smoothest and easiest means of leaning wheels, shifting rear axle and operating blade, pole steer or scarifier ever devised. When operator touches controls, the members move *instantly!* There are no loose joints...no slack to be taken up. Operation is so simple that a child can make adjustments without difficulty.

(2) ***Outstanding Strength***—Welded channel steel frame, heavy Z-shaped drawbars for the circle, and a one-piece cast steel circle with arms welded in place, give the entire machine the ability to withstand years of the severest twisting action of the roughest going.

(3) ***Flexibility***—The one-piece frame makes possible a thoroughly flexible machine, capable of resisting every twisting stress.

(4) ***Visibility***—Because of the one-piece frame construction, the operator is able to see the blade clearly . . . can produce a first-class finished job at minimum cost.

Enthusiastic reports from A-W Blade Grader owners and operators in every section of the country confirm every claim made for its strength, capacity and ease of control. The following letter from an Illinois Highway Commissioner is typical:

"The No. 12 Hydraulic Control Blade Grader which we purchased in March 1937 has been in regular use throughout the past year on heavy maintenance, bank sloping and ditching. Any machine as well made as this one does not get talked of very much because it gives us so little trouble in day-in and day-out performance.

"Compared with our previous hand-controlled grader, this new machine is almost human. Our operator can keep on the work, make accurate adjustments, and make them just when he needs them, so that the work goes faster and the job is better finished." (Name on request.)

AUSTIN-WESTERN

THE AUSTIN-WESTERN ROAD MACHINERY CO.,
1814 Barrows St., Aurora, Illinois

Please send complete engineering data and performance records covering:
☐ Hydraulic Control Blade Graders
☐ Hand Control Blade Graders.

Name.....
Address..... State BG806
City .....

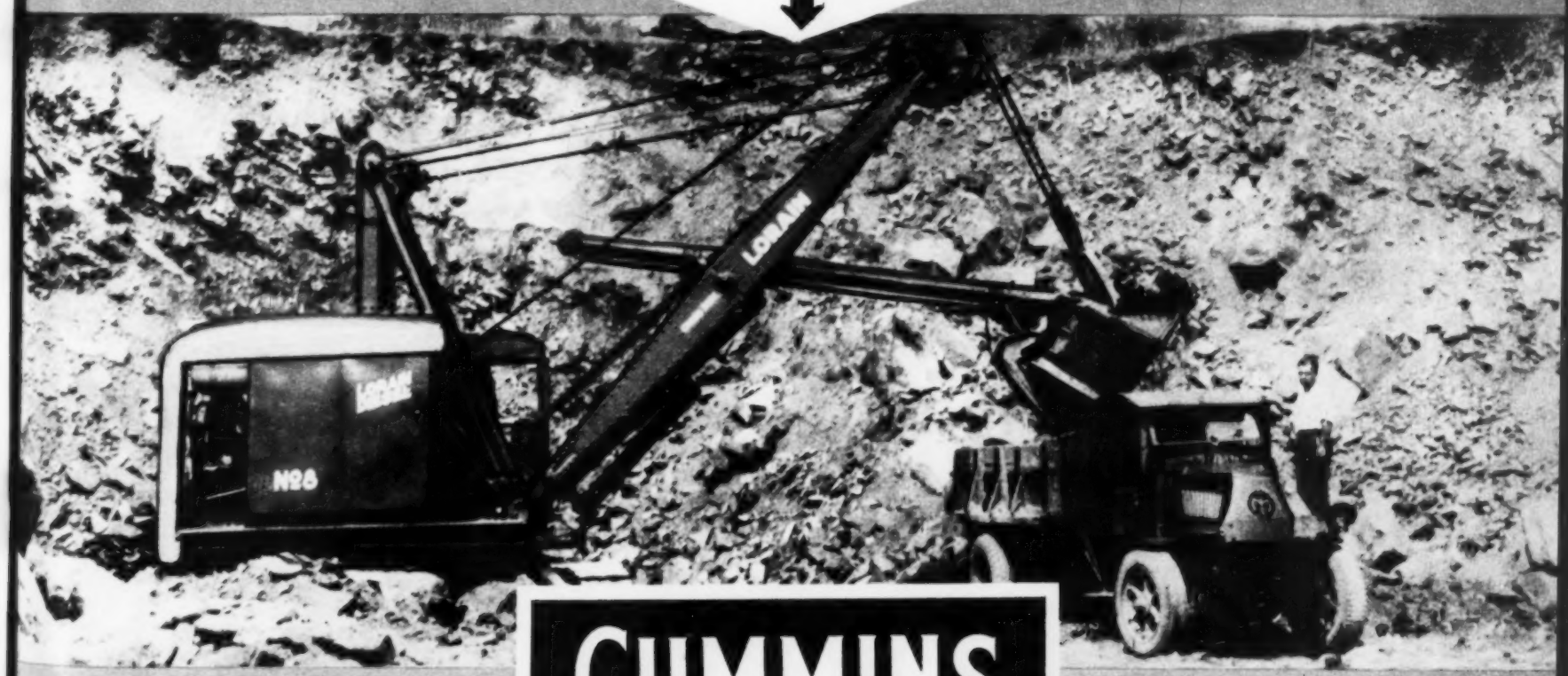
CUMMINS DIESEL "JOB-TEST EVIDENCE"

The Cummins Diesel is applying to you for a job . . . an opportunity to demonstrate that it can save money for you. Like any other competent workman, it invites a thorough investigation of its record . . . a check of its "job-test evidence" . . . where it is working . . . what it is doing . . . not alone on jobs similar to your own, but in *all* varied applications.

Cummins Diesel "job-test evidence" is your assurance when buying a diesel engine for your shovels, compressors, pumps or dump trucks.

CUMMINS ENGINE CO., 1712 WILSON ST., COLUMBUS, IND.

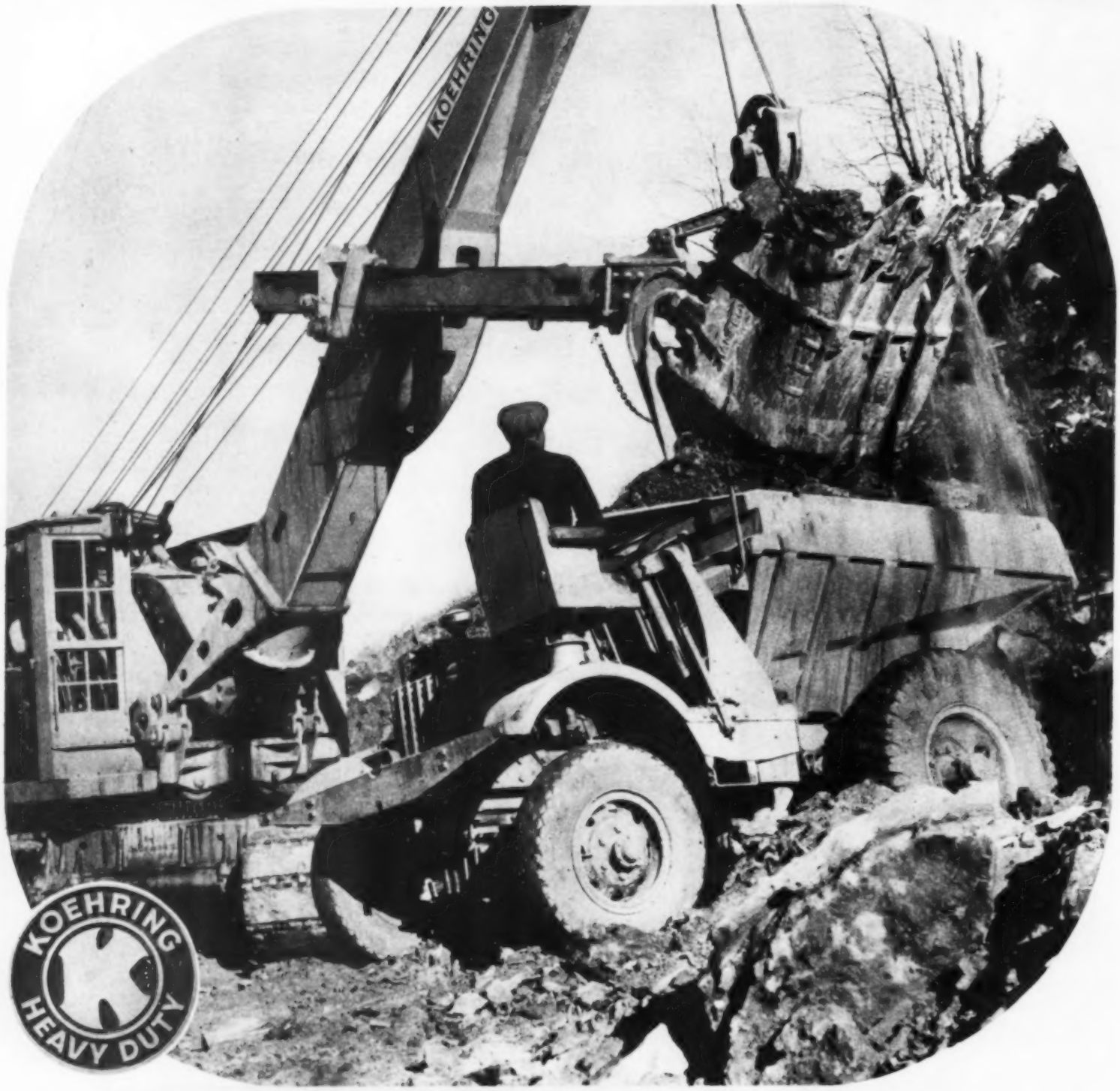
Maximum economy is assured this contractor who standardized on the Cummins Dependable Diesel for powering both the shovel and the dump truck.



CUMMINS
Dependable
DIESEL

PIONEER IN MODERN DIESEL DEVELOPMENT

KOEHRING

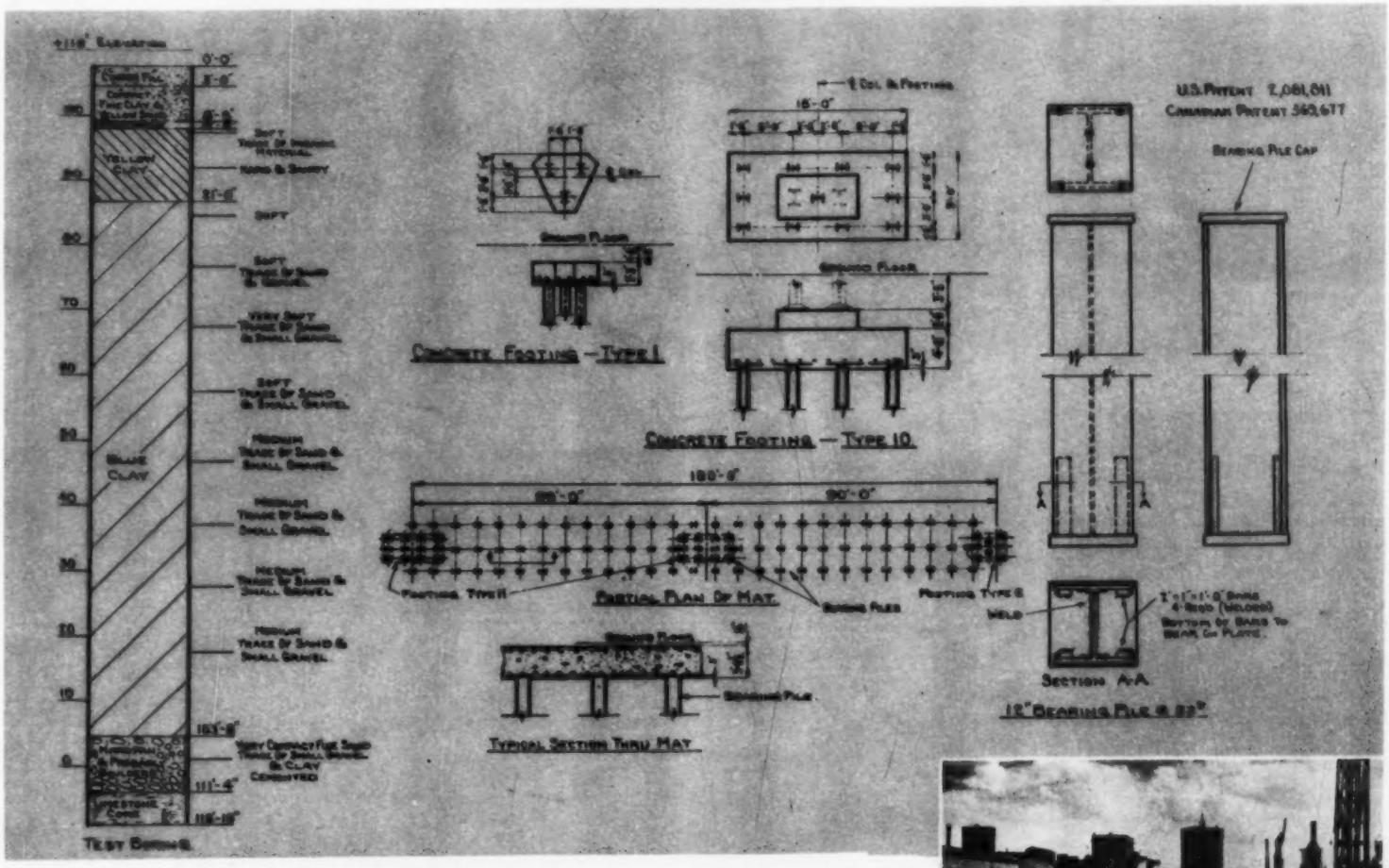


SPEED FOR PROFIT— cut rock and dirt-moving costs by the use of high speed equipment. Koehring Excavators and Dumptors increase production due to the maximum flexibility and high operating speeds. Easy and close-up Dumptor spotting reduces shovel swing time. Quick get-away reduces shovel waiting time. High speed excavating requires high speed dirt-moving units for maximum possible profit.

KOEHRING COMPANY
CONSTRUCTION EQUIPMENT • MILWAUKEE, WISCONSIN

CONSTRUCTION DETAILS OF WORLD'S

Biggest Steel Bearing Pile Job



8121 H-PILES DRIVEN FOR FORD MOTOR COMPANY'S RIVER ROUGE PRESS PLANT

IN this project, which sets a world's record as the greatest lineal footage of steel bearing piles (929,245 lin. ft.) ever driven in an industrial undertaking, construction methods were employed that are of engineering interest.

The log of a typical test boring is shown at the left. From the soil conditions indicated, 12" CPB Piles, weighing 53 lbs. per lin. ft., were selected to carry the design load of 55 tons per pile. This load produced a unit stress only slightly over 7000 psi.

Test driving disclosed the fact that open-ended piles could be driven 15-22 feet into hard pan. Closed end piles, with plates on bottom, driven 5 to 8 feet into hard pan gave the same bearing capacity, saved 10 to 12 feet length per pile. They were driven to resistance of 8 blows per inch for the last 3 inches with a No. 0 Vulcan Hammer or 12 blows with a No. 1 Vulcan Hammer.

As the 105 ft. piles used were longer than the height of the pile rigs, a 25 ft. hollow spud with trap door at bottom was first driven. Withdrawing the spud a few feet opened this trap door. The long length pile was then dropped into the hollow spud. This brought the top of pile down far enough to be placed under the hammer in the leads. Driving then proceeded in the usual manner. After the pile was driven the hollow spud was withdrawn. It was necessary to use a hollow spud—which could be left in place while the pile was driven—clay here being so soft that the hole would not remain open when a solid spud was withdrawn.

After driving, piles were cut off to grade with a torch, care being taken to keep ends square with the pile axis. Carnegie-Illinois Pile Cap Plates were then welded to top end of pile. This plate has holes which outline the shape of the bearing pile section and all welding is done from the top through these holes. As this permits cutting the pile off close to the ground, there is no need for long projection to permit welding of cap from below. After welding on cap plates, reinforcing rods were placed and the concrete footings or solid mats were poured as usual.

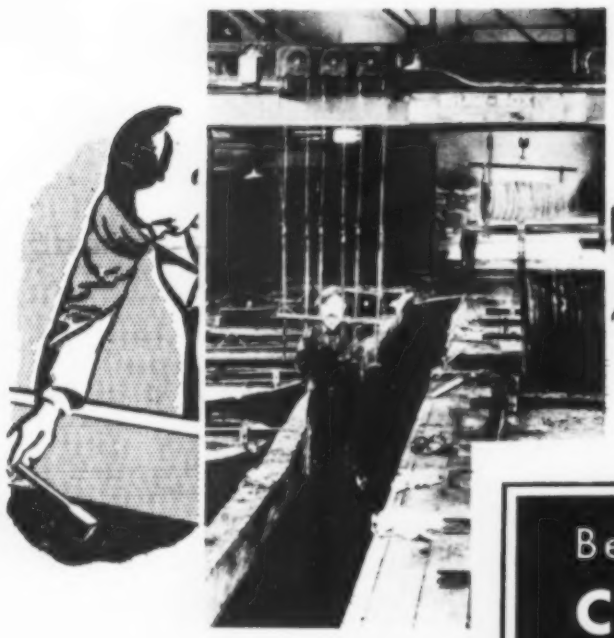
U·S·S STEEL BEARING PILES

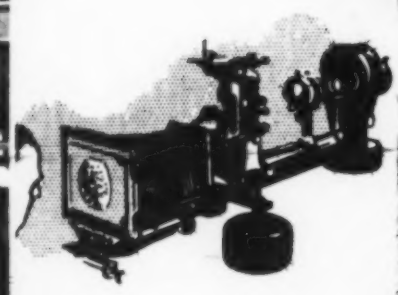
CARNEGIE-ILLINOIS STEEL CORPORATION

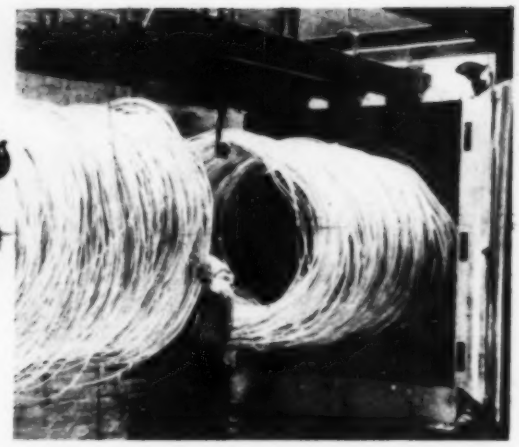
Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL





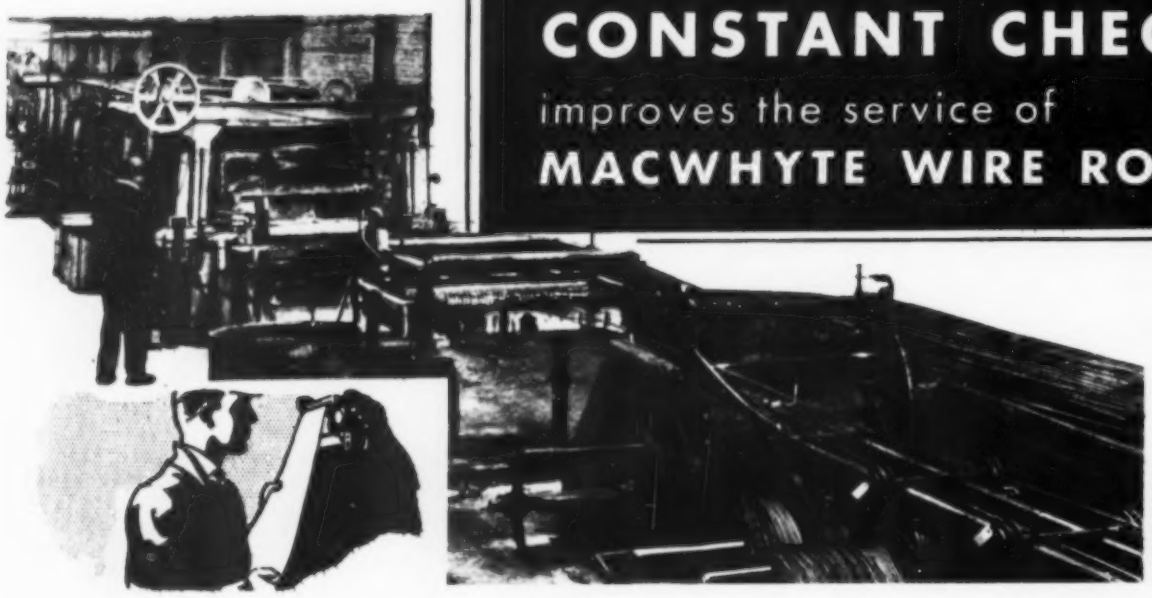


Behind the scenes . . .

CONTINUOUS TESTING, CONSTANT CHECKING

improves the service of

MACWHYTE WIRE ROPE



Remember . . . 'way back . . . when making wire rope was simply a matter of stranding several good lengths of wire?

Fortunately times have changed. Today making wire rope, as it's made at Macwhyte, is a scientific business.

Long Service Life built into Macwhyte rope

No matter what the operation . . . heat treating . . . pickling . . . wire drawing . . . at the Macwhyte mill metallurgists constantly check every step with the latest scientific equipment. Still later, Macwhyte engineers test and check the performance of the rope in the field.

This kind of supervision has proven time and again on the job, that longer service life and more economical operation *can* be built into wire rope.

Perhaps this is a reason why there are more users of Macwhyte PREformed and Regular Wire Rope today than ever before.

MACWHYTE COMPANY, KENOSHA, WISCONSIN

Manufacturers of wire rope and braided wire rope slings. Distributors and stock throughout the U. S. A. for quick service.

MACWHYTE

Whyte Strand - PRE formed

THE WIRE ROPE WITH THE INTERNAL LUBRICATION

Mr. George Cudahy, Supt. of the Wire Mill, explains: "We work hand in hand with the laboratory. They help us and we help them. Together we make what we believe is the best wire you can find *anywhere*."

LOOK FOR THE

Whyte Strand

MACWHYTE
WHYTE STRAND
IS BETTER
BECAUSE IT'S MADE
BY SPECIALISTS

NO. 3784

Here's the Lowdown on 3/4 YD. DIESEL LORAIN-40 Performance

THEW CENTER DRIVE

Read these reports of increased production and lower operating costs.

SHOVEL . .

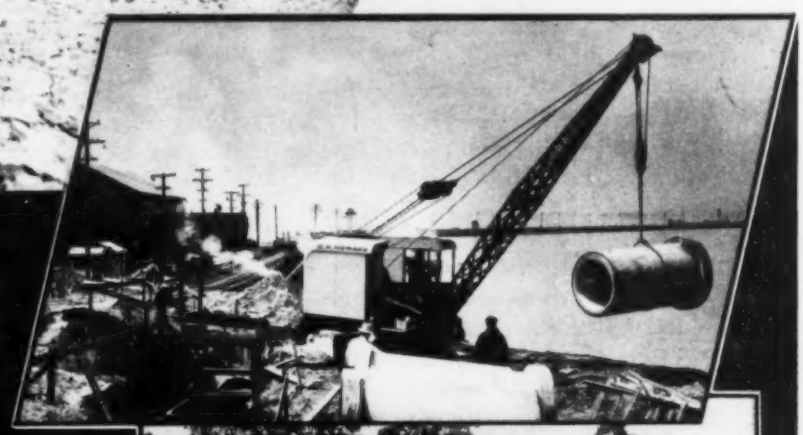
This Lorain shovel works 21 hours a day handling shot rock. Average fuel consumption—1¾ gallons per hour. Production—1500 to 2000 tons per day.

CRANE . .

Setting 39" concrete tile, weighing about four tons per section, for waterline. This Lorain used ¾ gallon of Diesel fuel oil per hour, costing 4½¢ per gallon.

DRAGLINE . .

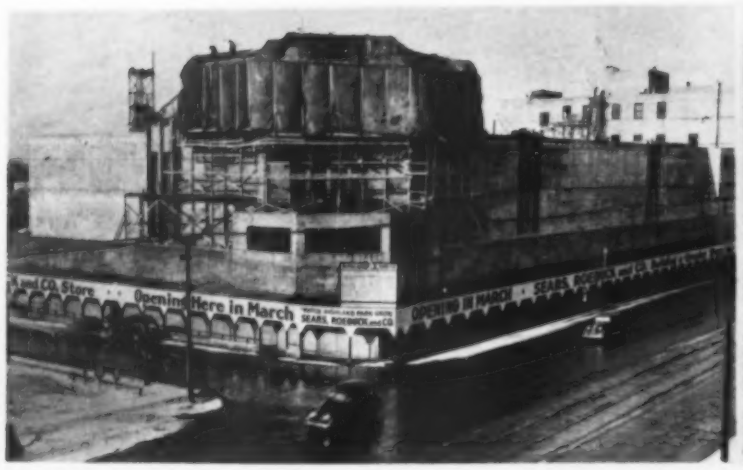
Lorain handled 6000 tons of clay gravel on 100 gallons of fuel oil costing 7½¢ per gallon. Typical production—loaded 1019 tons in 12 hours.



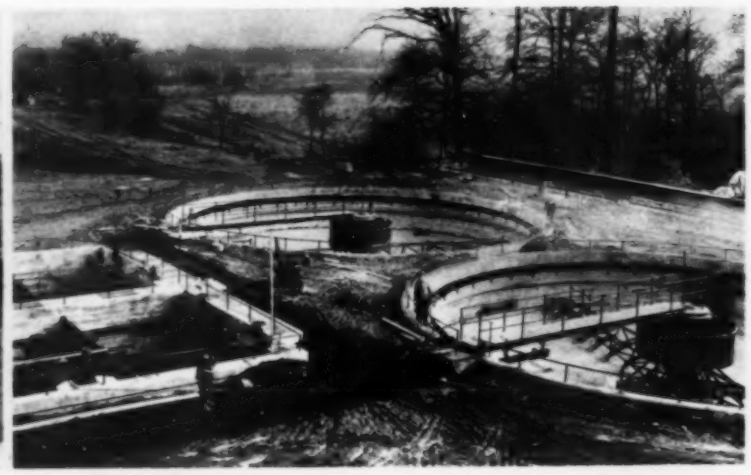
And remember this

—the Lorain-40 is the only ¾-yd. machine which offers you economical Caterpillar Diesel power plus the greater capacities, direct power application, and simplicity of Center Drive design. It's a great combination for profits. Write today for catalog and performance data on the ¾-yd. Diesel Lorain-40.

UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO

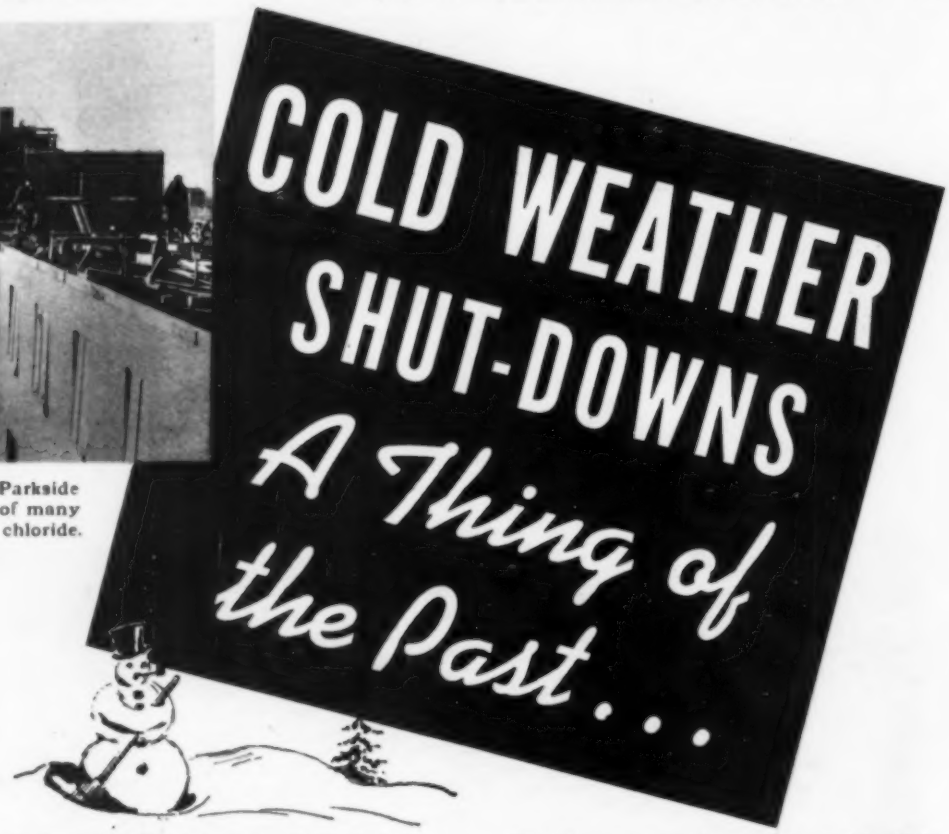


"OPENING IN MARCH", says the banner on this department store job in Highland Park, Michigan. During the danger period before adequate heating was possible, calcium chloride was used in the concrete.



DURING WINTER MONTHS a calcium chloride admixture in the concrete permitted these sewage treatment tanks in Ohio to be placed as one continuous job, since finishing followed placing in rapid order.

CALCIUM CHLORIDE was used in concrete for floors in this Parkside Housing Project, at Detroit. Year 'round construction of many other F. H. A. projects has been facilitated by calcium chloride.



WITH the coming of cold weather, the automobile owner used to garage his car, jack up the tires, drain the radiator and remove the battery. Transportation by auto was "shut-down" for the winter. Today, he puts anti-freeze in the radiator, hooks up the heater and defroster, and operates his car the year' round.

It's the same with concrete construction. Not many years ago, the coming of cold weather meant the end of work. Today, the contractor or engineer simply takes the necessary measures for protection against freezing, then adds calcium chloride to the concrete, and carries on his construction schedule uninterrupted by seasonal weather changes.

That calcium chloride cuts the curing time of concrete approximately in half has been proven by the country's foremost technical authorities and backed up on thousands of concreting jobs. The National Bureau of Standards reports, "At 40 degrees F. the standard portland cement concrete attained the safe compressive strength in 14 days... Upon the addition of calcium chloride, this same strength, at the same temperature, was attained with the standard cements in 7 days." The Bureau found, too, that with calcium chloride in the mix, the three-year strength is "appreciably increased," and that the flow — the measure of workability — is raised from 29 to 41.

In accelerating the rate of hardening, calcium chloride makes protective measures necessary only half as long, permits early removal of forms, saves labor. In making concrete more workable, forms are filled easier and more completely, a smoother finish is produced, and less pointing-up is required.

Engineers, contractors and building officials who control concreting specifications have made cold weather shut-downs a thing of the past—by including calcium chloride in all concrete placed during cold weather. If you are not already doing so, take advantage of this modern aid to concreting on your present job, your next job. On future jobs, you'll use it automatically.

Write today for complete data on methods of using calcium chloride in dry flake or solution form.

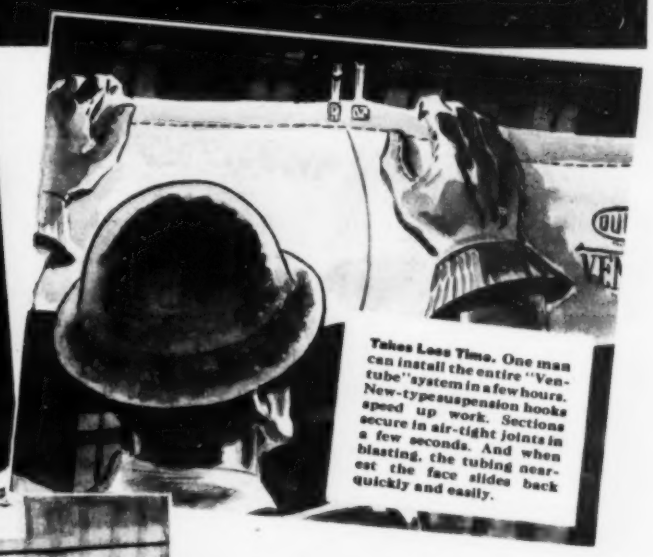
CALCIUM CHLORIDE ASSOCIATION • 4145 PENOBSCOT BLDG., DETROIT, MICH.

CALCIUM CHLORIDE

YEAR 'ROUND CONCRETE CONSTRUCTION

HERE'S WHY *it costs less to ventilate with* "VENTUBE"

Initial Cost is Less. All the equipment required is a small motor-driven fan and adequate "Ventube" rubberized ventilating duct to reach the working face. No expensive machinery to buy. No heavy, massive equipment to move from job to job.



Takes Less Time. One man can install the entire "Ventube" system in a few hours. New-type suspension hooks speed up work. Sections secure in air-tight joints in a few seconds. And when blasting, the tubing nearest the face slides back quickly and easily.

You Salvage the Entire System. When the job is finished, just take the "Ventube" down, roll it up and carry it to the next job. You can use the same tubing over and over again.

Saves Money by reducing man-hours. "Ventube" gets rid of dust, smoke and powder fumes in a hurry. No time is lost in waiting for the atmosphere to clear.

Du Pont heavy duty powder bags are made of the same material as is "Ventube." Compact and roomy. Heavily coated and impregnated with resistant rubber that won't peel off. Available in several serviceable sizes. Write for prices and complete information.

(*Above, left*) Regular type "Ventube" eliminates dust by blowing fresh air into the tunnel. (Above, right) Non-Collapsible "Ventube" sucks the dust and stale air out . . . and draws fresh air through the tunnel up to the working face.

"VENTUBE" reduces the dust count well below the safe hygienic limits—and far *exceeds* the legal requirements for dust control. On big jobs everywhere "Ventube" is helping keep costs down and speed up work. There's a distributor located nearby who will be glad to submit plans for giving you the safest, most efficient ventilation at lower cost.

THE FLEXIBLE DU PONT VENTUBE VENTILATING DUCT

E. I. DU PONT DE NEMOURS & COMPANY, INC.

"Fabrikoid" Division *Fairfield, Conn.*

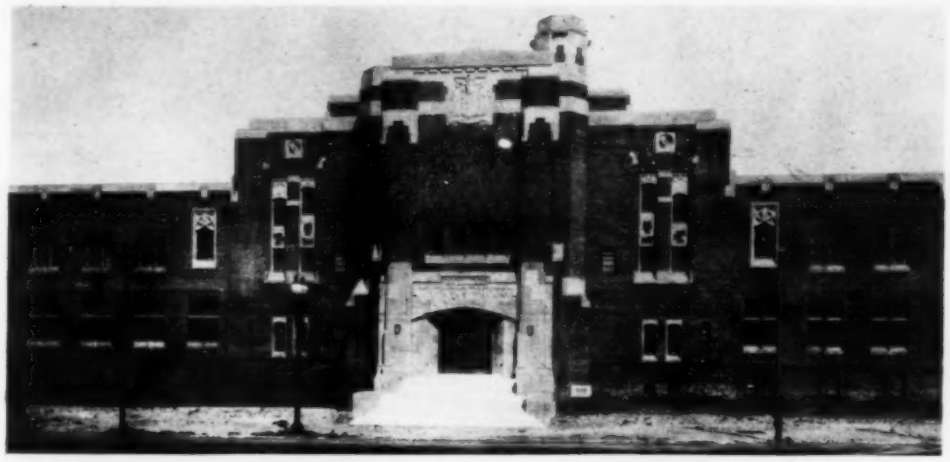
Construction Methods and Equipment

Established in 1919

A McGRAW-HILL PUBLICATION

ROBERT K. TOMLIN, Editor

Volume 20 | **October, 1938** | Number 10



NATIONAL GUARD ARMORY at Schenectady is one of largest all-welded steel-frame structures in upstate New York.

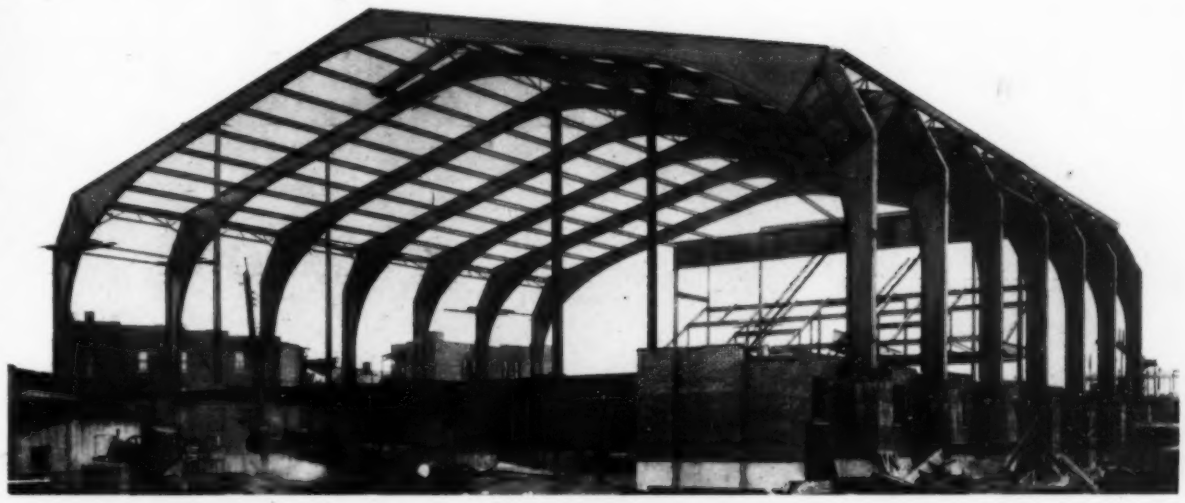
ELECTRIC WELDING

Fuses Joints of Armory's Steel Frame

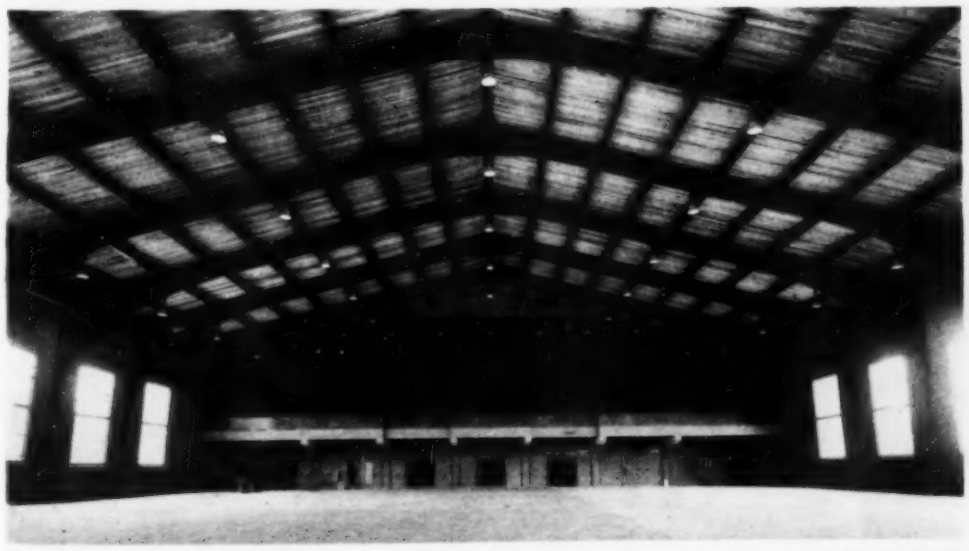
ELECTRICALLY WELDED throughout, the steel frame of a large National Guard armory at Schenectady, N. Y., went up in comparative silence, to the great satisfaction of management and guests in a nearby hotel. Notable as one of the largest all-welded steel-frame structures in upstate New York, the armory is the fourth building of this construction to be completed in Schenectady. Outstanding elements of the steel frame are seven 150-ft. two-hinged arches supporting the roof over the drill hall and a 92-ft. plate girder carrying an end wall and roof structure above a spectators' balcony.

Early operations at the site involved the rerouting of a storm sewer and the driving of 900 foundation piles. Selection of welding for the structural framing permitted economies in steel design. Welding was done with G. E. machines and electrodes. Under the steel roof arches is an unobstructed floor area of 26,300 sq.ft. in the drill hall.

Previous all-welded structures erected in Schenectady are the Y.W.C.A. and Y.M.C.A. buildings and the city hall. Two other buildings only recently completed or under construction (a new home for WGY radio station and a large addition to Ellis Hospital) increase the city's total of all-welded structures to six.



SEVEN TWO-HINGED ARCHES of 150-ft. span support roof of armory. All steel, including framing under drill floor, is electrically welded.

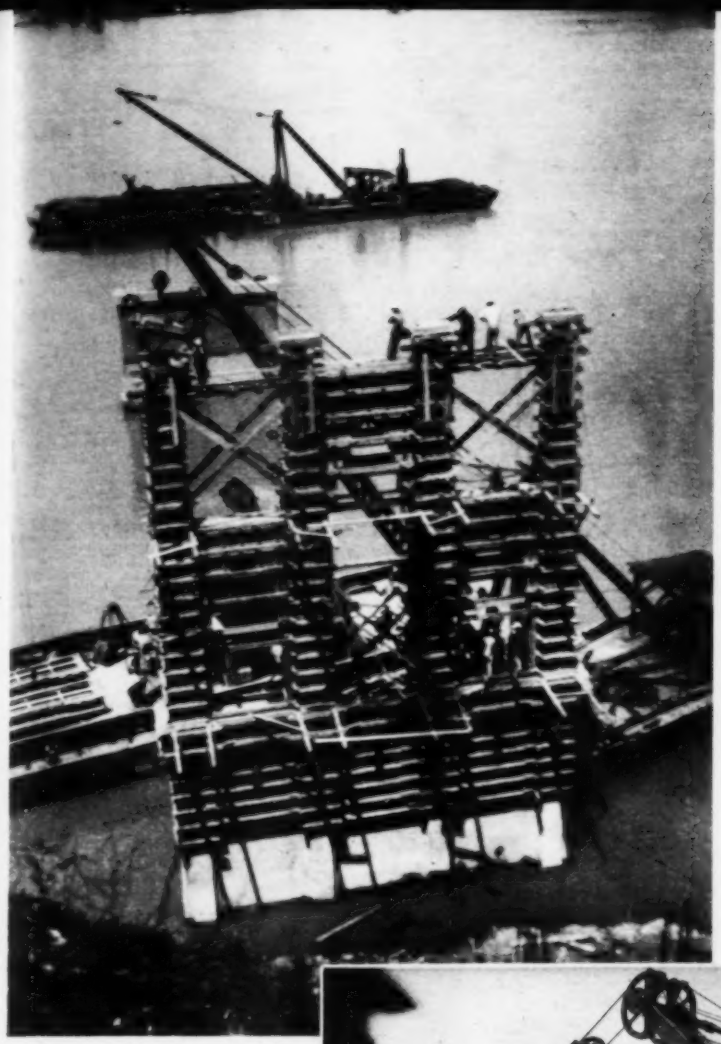


DRILL HALL (left) has 26,300 sq.ft. of clear floor space under roof arches. At far end is 92-ft. plate girder carrying curtain wall and roof above balcony.

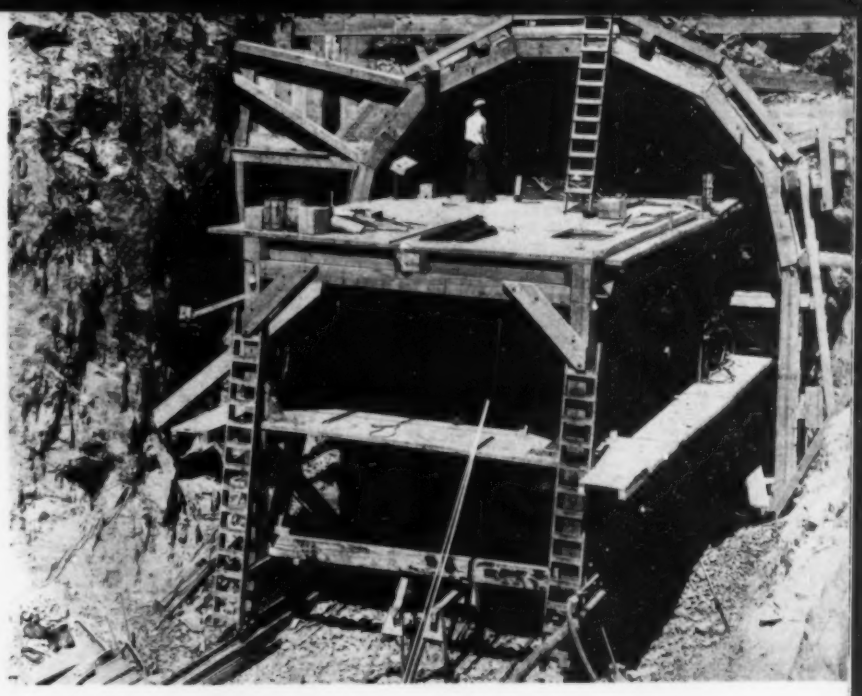
NEW YORK WORLD'S FAIR begins to show outlines of its final form as additional buildings rise in central exhibit area, dominated by completed steel frames of 700-ft. Trylon and 200-ft.-diameter Perisphere, which are still to be sheathed. Less than one-half of total Fair area appears in this view. In foreground is Horace Harding Blvd., intersected at left by Grand Central Parkway. At right is Flushing River, flowing toward Flushing Bay in distant background. Just beyond exhibit area may be seen Long Island R.R. and elevated structure carrying tracks of B. M.T. and I.R.T. subways. **AFTER COMPLETING FRAMES** of Trylon and Perisphere, steelworkers receive awards of merit from Mayor La Guardia while Grover A. Whalen (left), president of Fair Corporation, and L. A. Paddock, president of American Bridge Co., contractor, look on. Scrolls are presented to fifty-four steelworkers.

This Month's
"NEWS REEL"

SAN JACINTO TUNNEL (below) holes through on its 6¾-mi. east section July 28, leaving only 4,800 ft. of west section between Lawrence adit and Potrero shaft to be excavated before driving of 13-mi. tunnel is completed. Hard rock miners of Metropolitan Water District of Southern California are driving tunnel, which is last of 38 bores on 392-mi. aqueduct from Parker dam on Colorado River to Los Angeles and surrounding cities.



CONCRETE PIERS AND BENTS take form to carry 2,070-ft. long bridge across Tennessee River between Florence and Sheffield, Ala. Substructure being built by Hardaway Contracting Co., of Columbus, Ga., involves nine piers, four bents and two abutments. Three of river piers extend 60 ft. below water surface. Construction is handled by open cofferdams of 65-ft. steel sheetpiling, using clamshell bucket to excavate material within inclosure and sealing with concrete. Above water level concrete is supplied to forms by floating batching and mixing plant. — Photo from W. R. BOYER, Hardaway Contracting Co., Florence, Ala.

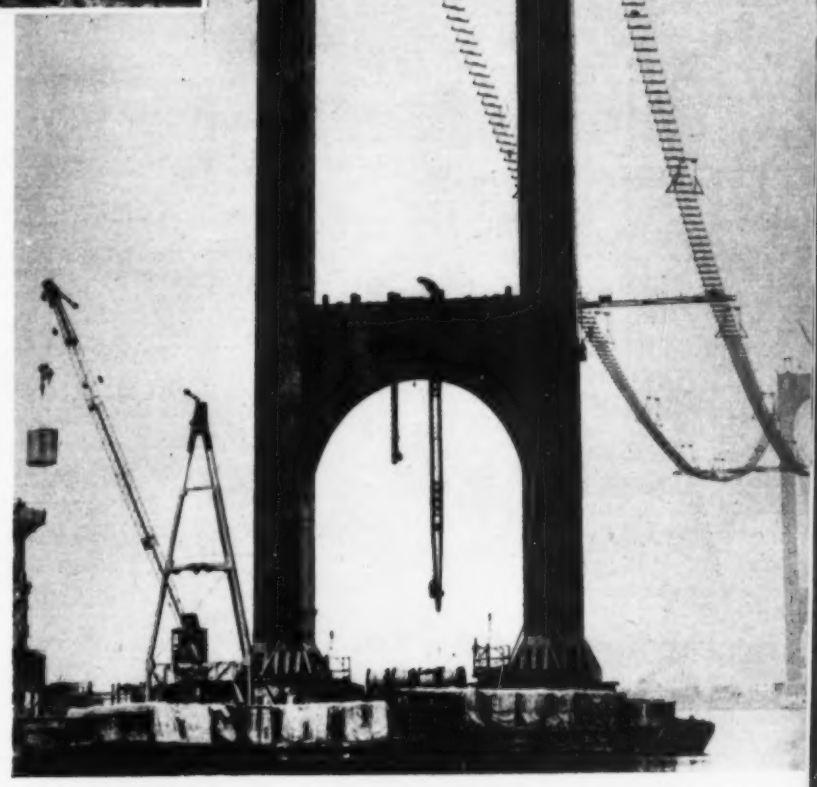


AT SHASTA DAM SITE, Calif., Colonial Construction Co., Spokane, Wash., contractor for railroad bypass tunnel through which Southern Pacific trains will be routed during early construction of dam, opens up downstream portal and brings in drill jumbo to advance heading, in which three shifts are working 24 hr. a day under direction of U. S. Bureau of Reclamation. Pacific Constructors, Inc., contractor for dam, is ready to begin operations on key unit of Central Valley project. — Photo by U. S. Bureau of Reclamation.

BLUE WATER INTERNATIONAL BRIDGE completed and dedicated last month is cantilever structure crossing St. Clair River between Port Huron, Mich., and Sarnia, Ont. Central span of flat-arch design 871 ft. long provides 150-ft. clearance above river. Anchor arms of 326-ft. span and approaches about ½ mi. long on each side of river give bridge overall length of almost 1¼ mi. Steel erection by American Bridge Co.

$65,000,000 HOUSING DEVELOPMENT by Metropolitan Life Insurance Co., in Bronx, N. Y., gets under way with start of grading operations on 120-acre site. Apartment buildings in project, 40 per cent of which is expected to be ready for occupancy in summer of 1939, will house total of about 47,000 persons. Built by limited dividend housing corporation, apartments in development are expected to rent for average of $12 per room per month.

BRONX-WHITESTONE BRIDGE (right), progresses toward scheduled opening in June, 1939, with stringing of temporary walkways by American Bridge Co. between 380-ft. steel towers to aid spinning of parallel-wire cables on 2,300-ft. main suspension span crossing East River, New York City. Suspension structure will have 735-ft. side spans and clearance of 135 ft. above high water.



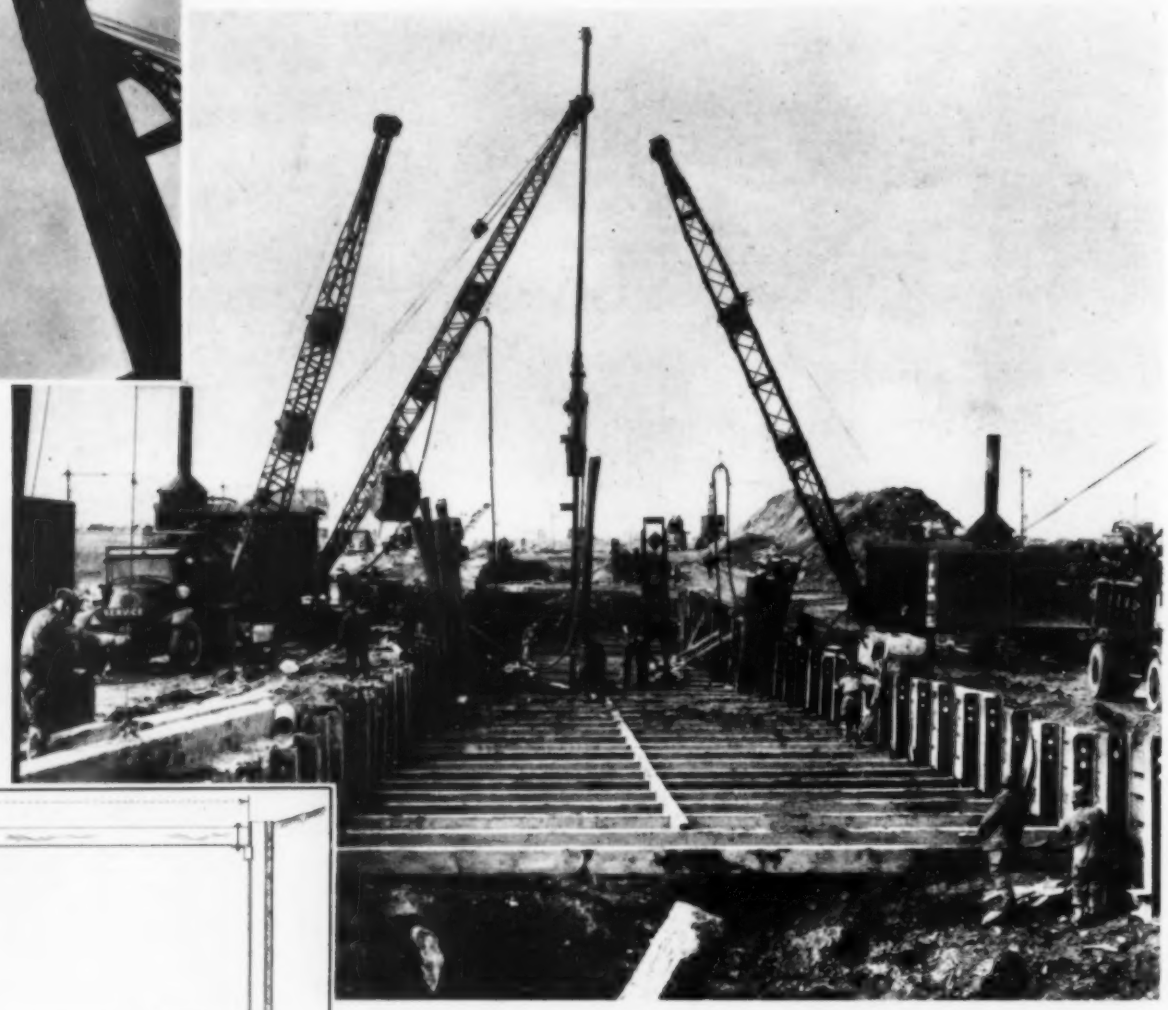
Fast-Moving Form System

Speeds Work on

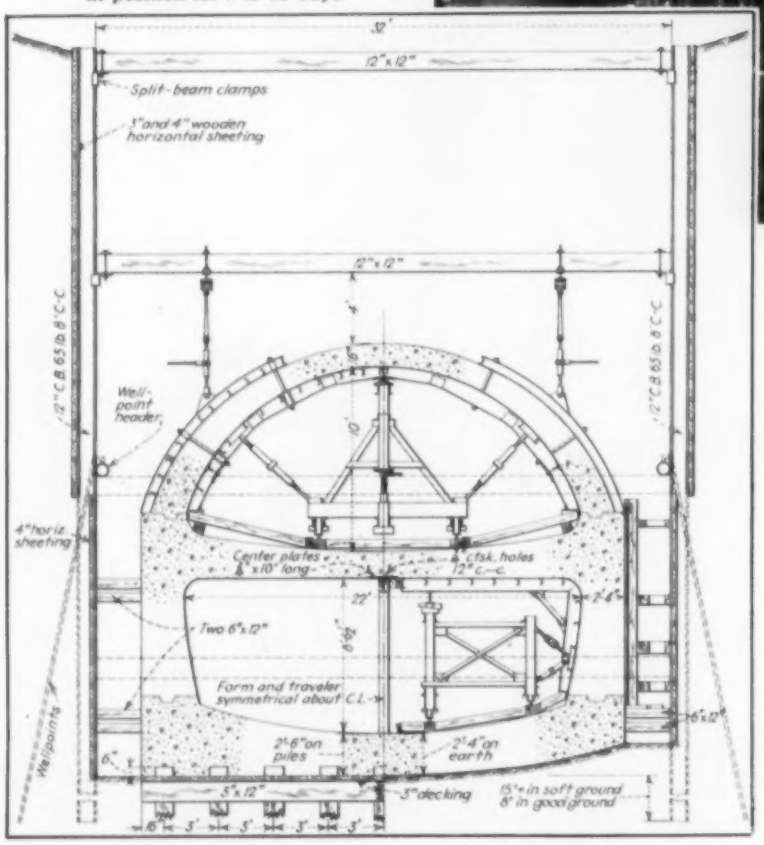
Double-Deck Sewer

STEAM HAMMERS in pair of leads drive as many as 170 40-ft. piles in 8 hr. Pile lengths vary from 25 to 60 ft. Swinging leads have 7,000-lb. double-acting hammer; controlled leads are equipped with 6,800-lb. single-acting hammer.

DOUBLE-DECK SEWER (below) of large dimensions is concreted by progressive steps in three lifts at average rate of 120 lin.ft. per week. Forms in 60-ft. lengths for two barrels are struck second day after concrete is placed, but central roof supports in lower chamber remain in position for 7 to 10 days.



BETWEEN TWO LINES of steel H-piles driven in advance, cranes dig trench, and construction crew installs sheeting and cross-bracing as excavation goes down. Two crane-operated piledrivers in background are putting down timber foundation piles in bottom of trench.



SKILLFUL PLANNING and expert management of steel setting and form moving operations have added flexibility and speed to the construction of a double-deck two-barrel trunk storm sewer for the Borough of Queens near the New York World's Fair site by Tully & Di Napoli, Inc., contractor, New York City. For most of its 3,660-ft. length the sewer is a double-deck structure with overall dimensions 27 ft. wide by 24 ft. high, approaching Flushing Bay at bottom elevations 7½ to 9 ft. below mean tide level, a maximum depth of about 14 ft. below high tide. Steel forms for the lower barrel were built in halves to permit moving them ahead without disturbing center shores left in place to support the roof. By setting up wooden frames and fabricating reinforcing steel for the top arch before moving forms into place, the contractor saves time between concrete pours and gains sufficient flexibility in steel setting to allow keeping the steel crew continuously employed.

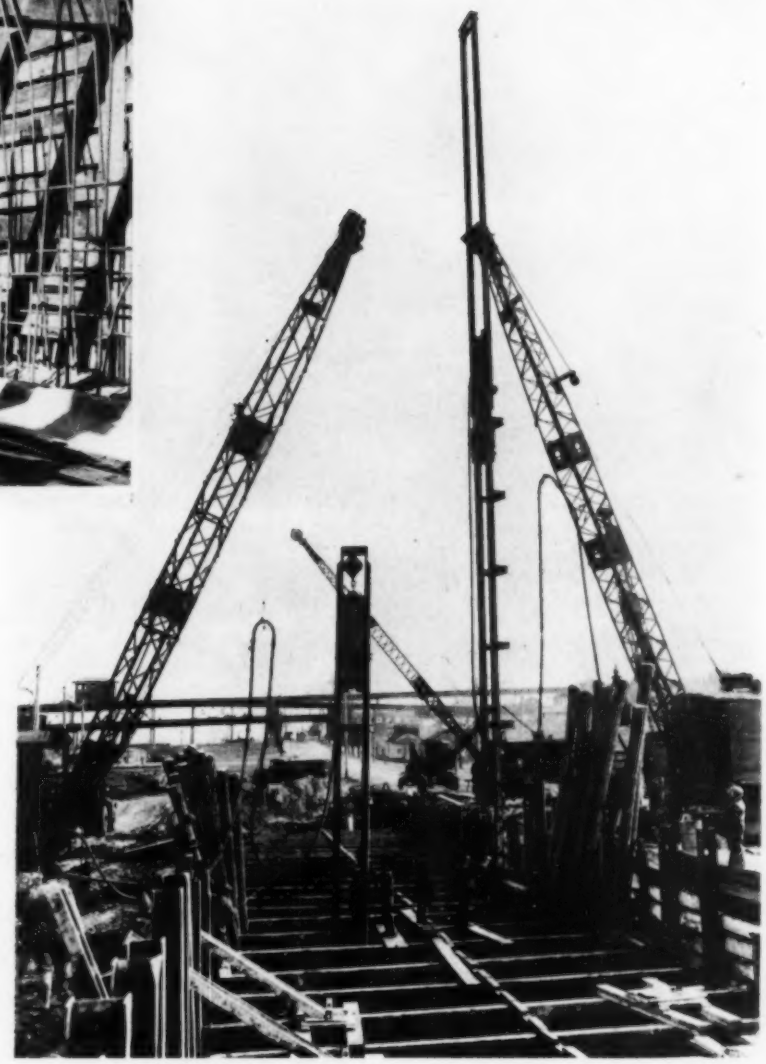
In combination with the system of setting reinforcing steel, a coordinated procedure for stripping, moving, cleaning and oiling forms cuts down the time of these operations and

EXTERIOR WALL FORM for lower barrel consists of wooden panels rolled forward on plank runway, blocked to grade and braced from steel H-piles. Lower tier of 12 x 12-in. struts has been removed to make way for wall reinforcement and forms.

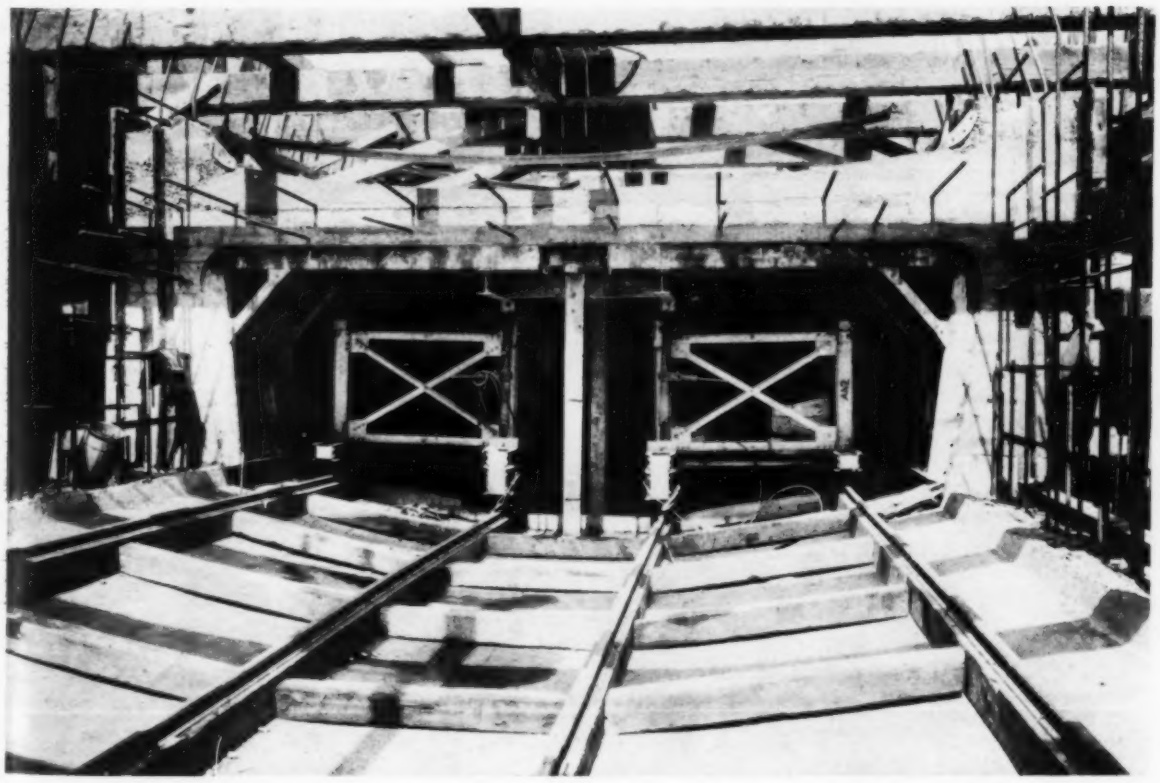
enables the construction crew to complete as much as 180 ft. of sewer in a 6-day week. This rate of progress is attained on the job under ideal conditions, but practical difficulties prevent its being maintained from week to week. Average construction progress in good weather is 120 ft. per week, involving a total of six 60-ft. concrete placements in the three lifts of the structure-invert, lower barrel and upper barrel.

Sewer Forms—Blaw-Knox traveling steel forms in 60-ft. units made up of 15-ft. sections are used for the interiors of both barrels and for the outside of the upper arch. Inside forms for the upper arch are collapsible and telescopic in design to meet the intention of the original construction schedule, which contemplated 30-ft. pours with intermittent moves of one set of forms through the other. On the job, because of the ease with which the 60-ft. form can be moved and set and of the method of erecting reinforcing in advance of form movements, 60-ft. pours have proved practical, and the forms have remained connected in full 60-ft. length, except on curves where the 15-ft. sections had to be used to build short chords in alternate pours.

Inside forms for the lower barrel, 22 ft. wide by 8 ft. 6½ in. high,



CONTROLLED LEADS, at right, sliding in guide frame at tip of boom, speed driving operations in trench by eliminating rotation and cable twisting. Working leads of this rig are similar to swinging leads at left, with addition of spliced extension operating through guide frame. Swinging leads have greater vertical latitude for working in trench of any depth, but controlled leads permit quicker, easier setting and driving. Truck crane puts piles in trench pockets to speed handling by drivers.



TRAVELING STEEL FORMS for lower barrel are made up in symmetrical units for two sides of chamber. Units can be moved forward individually by cables running to hand winches on carriages while center posts supporting roof remain in position. Track structure is framed in sections to be moved intact.

are built in two units, one for each side of the chamber, with a narrow steel center plate supported on timber posts to close the gap between them. The traveling form units are retractible, and the carriages are counterweighted to take care of the unbalanced forms. They can be stripped and moved ahead as soon as the concrete has set the minimum time required—usually on the second day after a pour. Narrow plates lightly fastened to wooden stringers on posts 5 ft. c. to c. support the flat slab roof along the center line and remain in place for 7 to 10 days. The contractor has about 1,200 lin. ft. of steel center plates on the job to permit leaving the roof supports in place as long as desired.

For the outside walls of the lower barrel, the contractor utilizes wood

BLOCKING between concrete and vertical H-beams replaces timber struts. Split beam clamps support struts above completed concrete structure.

INTERIOR ARCH FORM is collapsible steel traveler running on rails. Hauling line, reeved through anchor sheave ahead, runs back to hand winch on carriage inside forms.

INSPECTION DOORS (left) in outside arch form make it possible to install spreaders between inner and outer forms after reinforcement has been set and forms have been moved.

panels 11 ft. high by 10 or 10½ ft. long to make up 60-ft. lengths. Outer forms of the upper barrel are steel segments covering one-third of the arch at each side, leaving the top third open for hand finishing. Transit-mix concrete delivered from truck mixers is used in all parts of the structure. Sewer section on piles requires 9.1 cu.yd. per linear foot; the earth section, 8.2 cu.yd. per foot.

Sheeting and Bracing—Depth of cut ranges from 60 ft. to less than the height of the sewer, and the soil varies from sand to soupy clay. In the latter material, for a distance of about 1,000 ft., the sewer rests on timber piles driven into firm sand on 3-ft. centers in both directions with 3x12-in. bolted timber clamps and a solid 3-in. plank deck. Well points hold down the water level in sandy soil, and pumps lift inflowing groundwater out of sumps in the wet clay section. In the soft-bottom or pile-supported section, the invert concrete is placed on a plank platform to incase the top 6 in. of the

(Continued on page 59)

EARTH BACKFILL is made by tractor-bulldozer, 12 x 12-in. struts being removed as filling progresses. As final operation, pile extractor pulls steel H-beams.

PICK-UP TURNBUCKLES suspended from trolley I-beam strip exterior arch form and move it forward to new position. Man on runway is pulling back on hauling cable reeved to winch inside interior form.

BUFF BRICKS mark pedestrian lanes at intersection in Richmond, Va.

HAND TAMPING with one-man ram on 2-in. timber block beds bricks in gutter alongside curb.

Richmond Controls Base Cracks and Places Traffic Markers in Brick Pavement

STRAIGHTENING TOOL puts courses in alignment before brick are rolled. Center-line stripe consists of bricks of contrasting color placed in alternate courses.

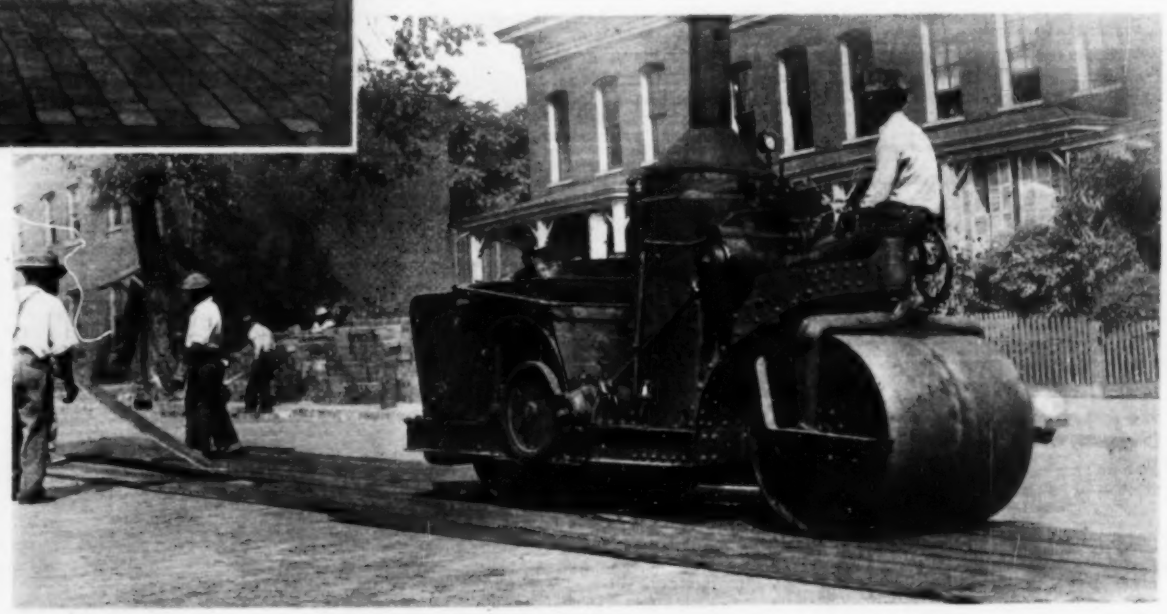
By A. MASON HARRIS
Chief, Bureau of Streets, Richmond, Va.

TO ASSURE a satisfactory brick surface, it is necessary to begin with a properly constructed smooth base which will give an even thickness of cushion throughout. It is also desirable to control contraction cracks which occur in a concrete base, and if possible to minimize their width to such an extent that they will not be visible in the brick surface.

Crack Control — In an attempt to control contraction cracks the Richmond Bureau of Streets experimented during 1937 with weakened planes in the bases. These planes were formed at 15-ft. intervals transversely across the base by embedding tough, durable building paper vertically into the base and a little more than one-half the depth of the base by means of a piece of ¼-in. steel cut to the crown of the street and of the desired depth. Six of these plates were used and they were left in the base as long as possible; that is, until the first one used was needed to form another weakened plane in the base just behind the concrete mixer.

Streets more than 40 ft. wide are poured one half at a time, which leaves a construction joint in the center, and the planes of weakness

(Continued on page 62)



ROLLING ON BOARDS (right) of uniform thickness permits use of heavier roller and avoids brick breakage and displacement of courses.

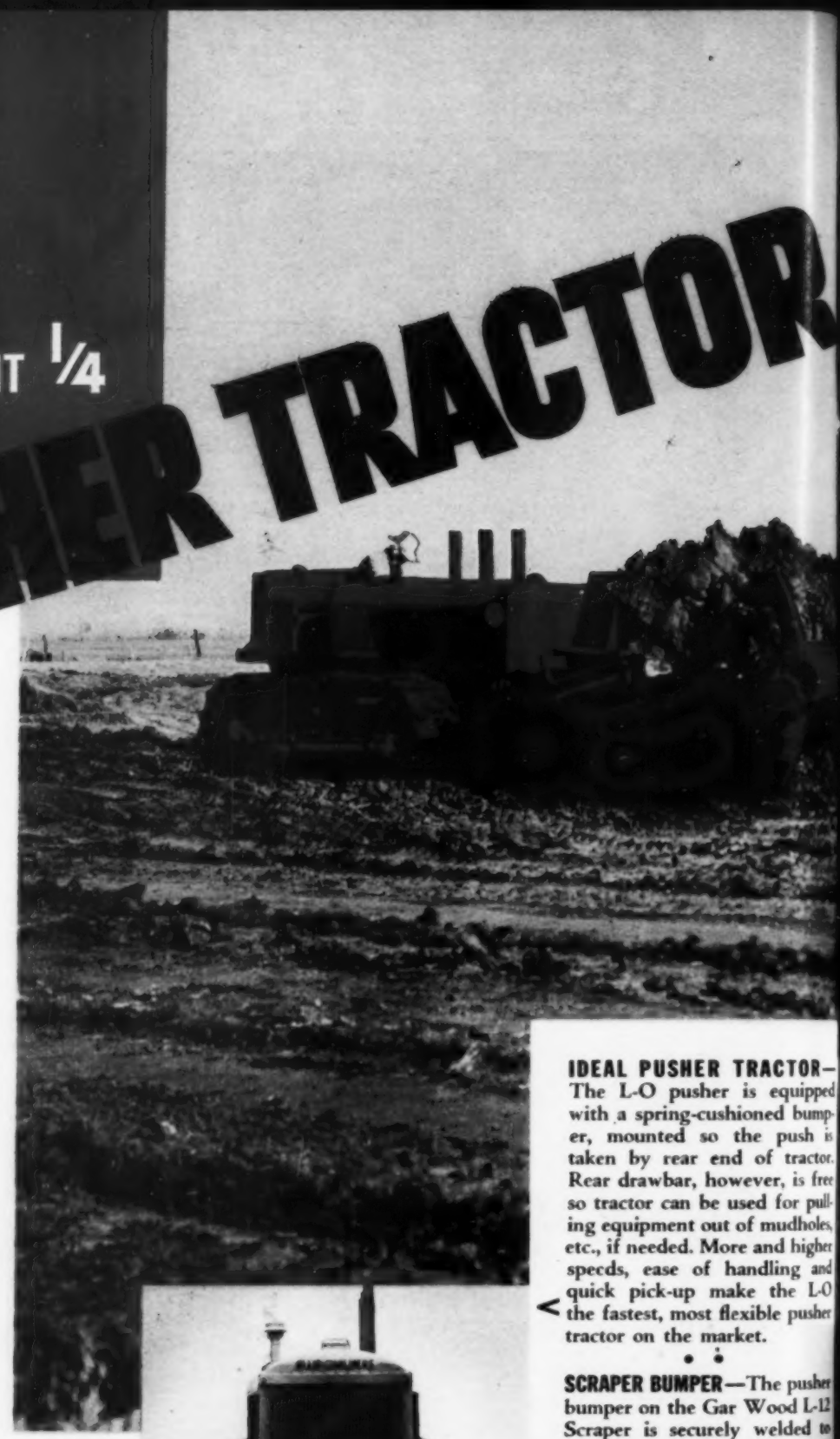
INCREASES PAY LOAD 1/3

REDUCES FIXED TIME 1/3

CUTS EQUIPMENT INVESTMENT 1/4

..WITH

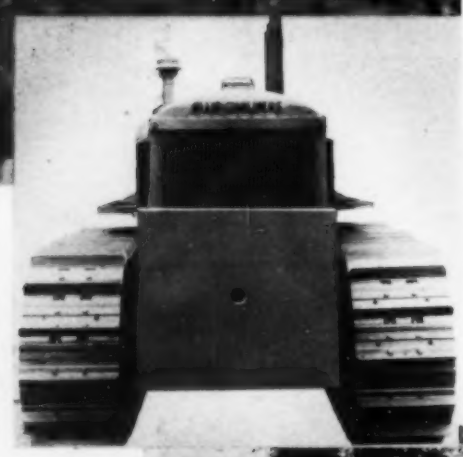
L-O PUSHER TRACTOR



To get more yardage, Hudkins & Perry put an L-O pusher tractor to work with their four L-O tractors and four L-12 Gar Wood scrapers on their 400,000-yard road job at Onawa, Iowa. Though heavy rains have made the material wet and sticky—difficult to handle with any equipment—the L-O pusher tractor enables the scrapers to pick up loads of 10 to 11 pay yards in an average loading time of .8 minutes. Its use has cut fixed time for loading, dumping and turning from 2.2 minutes to 1.5 minutes. Say Hudkins & Perry, these four tractor-scraper outfits with an L-O pusher handle as much, or more dirt than six outfits with no pusher. That's saving 25% on equipment!

Put an L-O pusher on your job. Watch its ***Faster Power*** boost scraper loads from 8-9 pay yards to 10 and 11 in half the usual loading time. You'll have less maintenance expense per yard, too, because the L-O pusher relieves the hauling tractors of the severe jerking and twisting strains of loading, thus reduces repair bills and time losses.

INVESTIGATE pusher loading with A-C tractors. Ask your Allis-Chalmers dealer how the L-O pusher can increase your yardage, reduce your costs and enable you to work later into the winter.



IDEAL PUSHER TRACTOR—The L-O pusher is equipped with a spring-cushioned bumper, mounted so the push is taken by rear end of tractor. Rear drawbar, however, is free so tractor can be used for pulling equipment out of mudholes, etc., if needed. More and higher speeds, ease of handling and quick pick-up make the L-O the fastest, most flexible pusher tractor on the market.

SCRAPER BUMPER—The pusher bumper on the Gar Wood L-12 Scraper is securely welded to the scraper frame and sets back far enough to enable the pushing tractor to make a quick and easy contact. Note the side and end boards on the scraper bowl to hold the extra yards put in by the pusher.

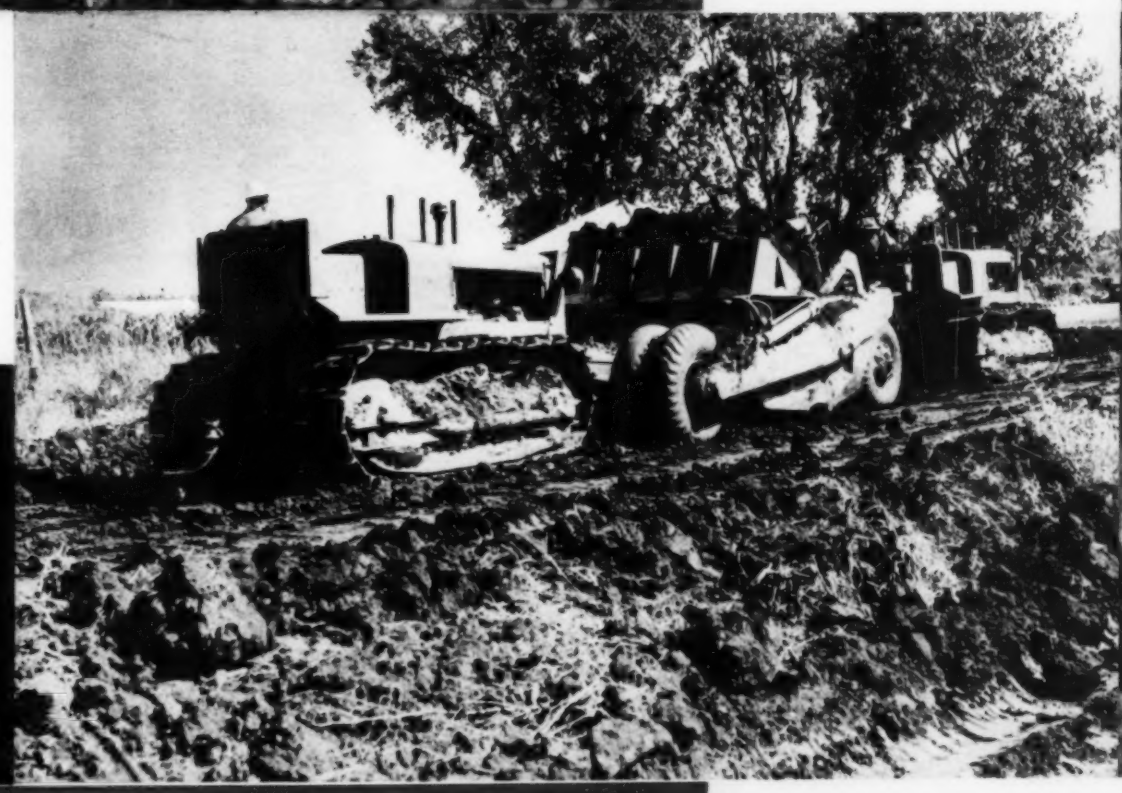
10 WAYS YOU GAIN

WITH THE L-O PUSHER

1. Load faster
2. Haul bigger pay loads
3. Move more loads hourly
4. Lower equipment investment
5. Less time out for bad weather
6. Lower maintenance cost
7. Less time out for repairs
8. Lower fuel consumption
9. Less operator fatigue
10. Smoother, faster work from your entire outfit

AND MORE YARDS LESS COST

BOILING OVER—Here the material is still wet, but the L-O pusher tractor puts a load in the L-12 Gar Wood that runs 10 to 11 pay yards every trip. Note the even cuts left by this method of loading—no gouging is necessary to get a load; there's less straining on tractor and scraper; less wear and tear on steering clutches; little or no job time lost by reason of breakdowns.



END OPERATOR ARM ACHES

There's less pulling on steering clutch levers, less shifting of gears, consequently less arm weariness among tractor-scraper operators when you load with the L-O pusher. Keep your operators fresh ... give a lift to your entire outfit and avoid that last-two-hours-of-the-shift letdown by using an L-O pusher tractor for scraper loading.

ALLIS-CHALMERS

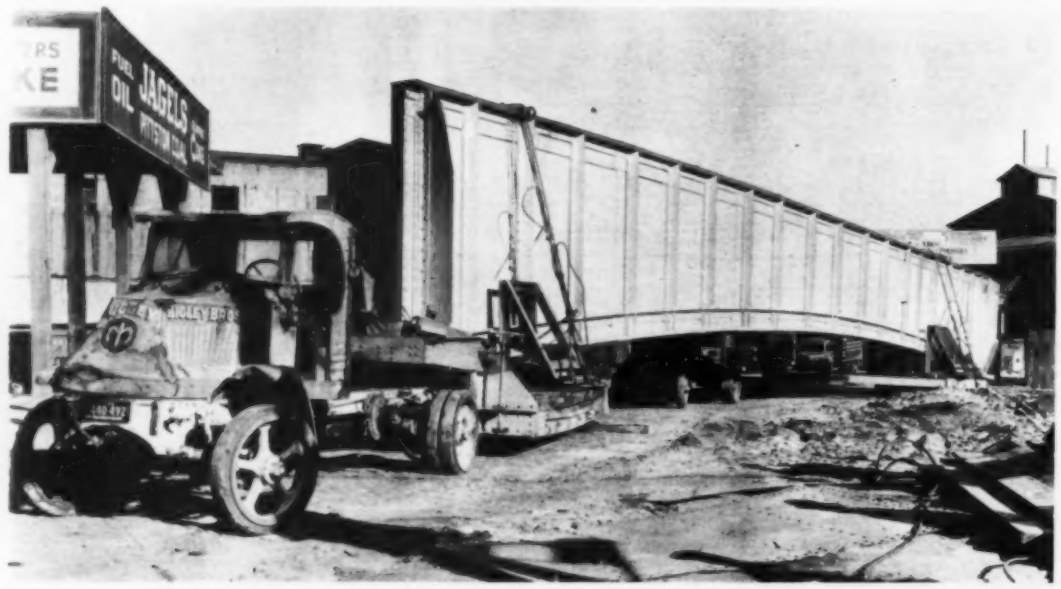
TRACTOR DIVISION—MILWAUKEE, U. S. A.

GASOLINE AND CONTROLLED IGNITION OIL TRACK-TYPE TRACTORS FROM 32 TO 80 DRAWBAR H.P. .. TANDEM AND SINGLE DRIVE SPEED PATROLS .. DRAWN BLADE GRADERS .. SPEED MAINTAINERS .. INDUSTRIAL WHEEL TRACTORS .. STATIONARY POWER UNITS FROM 31 TO 102 BRAKE H.P. .. TWO, FOUR AND SIX-WHEEL SCRAPERS, BULLDOZERS, TRAILBUILDERS, LOADERS, WINCHES AND OTHER ALLIED EQUIPMENT.

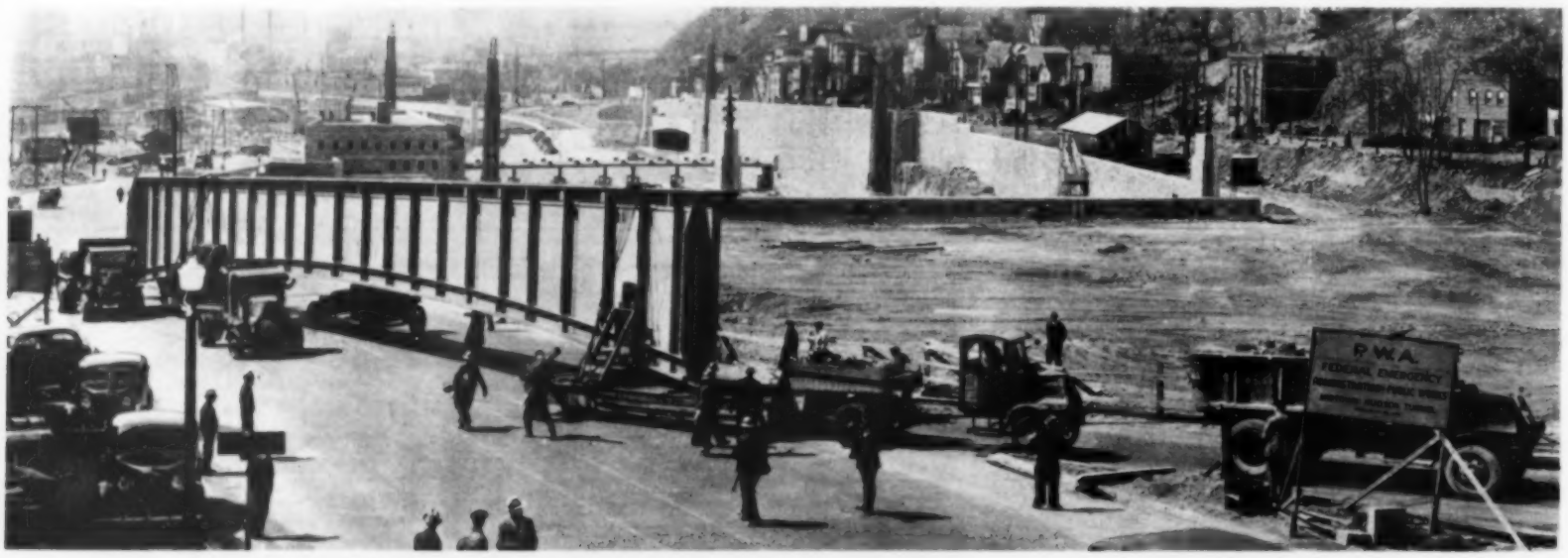
BIG LOADS ALL THE TIME—The L-O pusher puts a big load in the scraper regardless of soil conditions. The FASTER POWER of the L-O moves those bigger loads to the fill at speeds up to 6.41 m.p.h.—564 feet per minute! Faster loading, faster hauling, insure you more yardage every shift.

DEEP GIRDERS *Make Long Trip*

in Vertical Position from Fabricating Shop to Bridge Shoes



LEAVING RAILROAD YARD, heavy girders ride in vertical position on special trailers climbing earth roadway up 4 per cent grade.



ARCHED-FLANGE GIRDER, weighing 100 tons and measuring 141 ft. in length between bearing points, is hauled up 4 per cent grade on boulevard with aid of two additional trucks pulling rear trailer.

FOUR HEAVY BRIDGE GIRDERS (two arched-flange and two parallel-flange units) rest on special trailers ready to be hauled to bridge sites for erection.

SHIPPED AS INDIVIDUAL UNITS supported at two ends by swinging bolsters on railway cars, deep girders ranging up to 141 ft. in length and 103 tons in weight rode in vertical position from fabricating shops at Ambridge, Pa., near Pittsburgh, to Weehawken, N. J., where they were placed in the same position on special trailers of Bigley Bros., Inc., Hoboken, N. J., to be transported ¼ to 1 mi. to bridge sites for erection with tractor cranes by the American Bridge Co., holder of a subcontract involving 2,500 tons of steelwork on the Lincoln Tunnel's New Jersey approaches, under Geo. M. Brewster & Son, Bogota, N. J. contractor, for the Port of New York Authority. Among a dozen heavy steel members

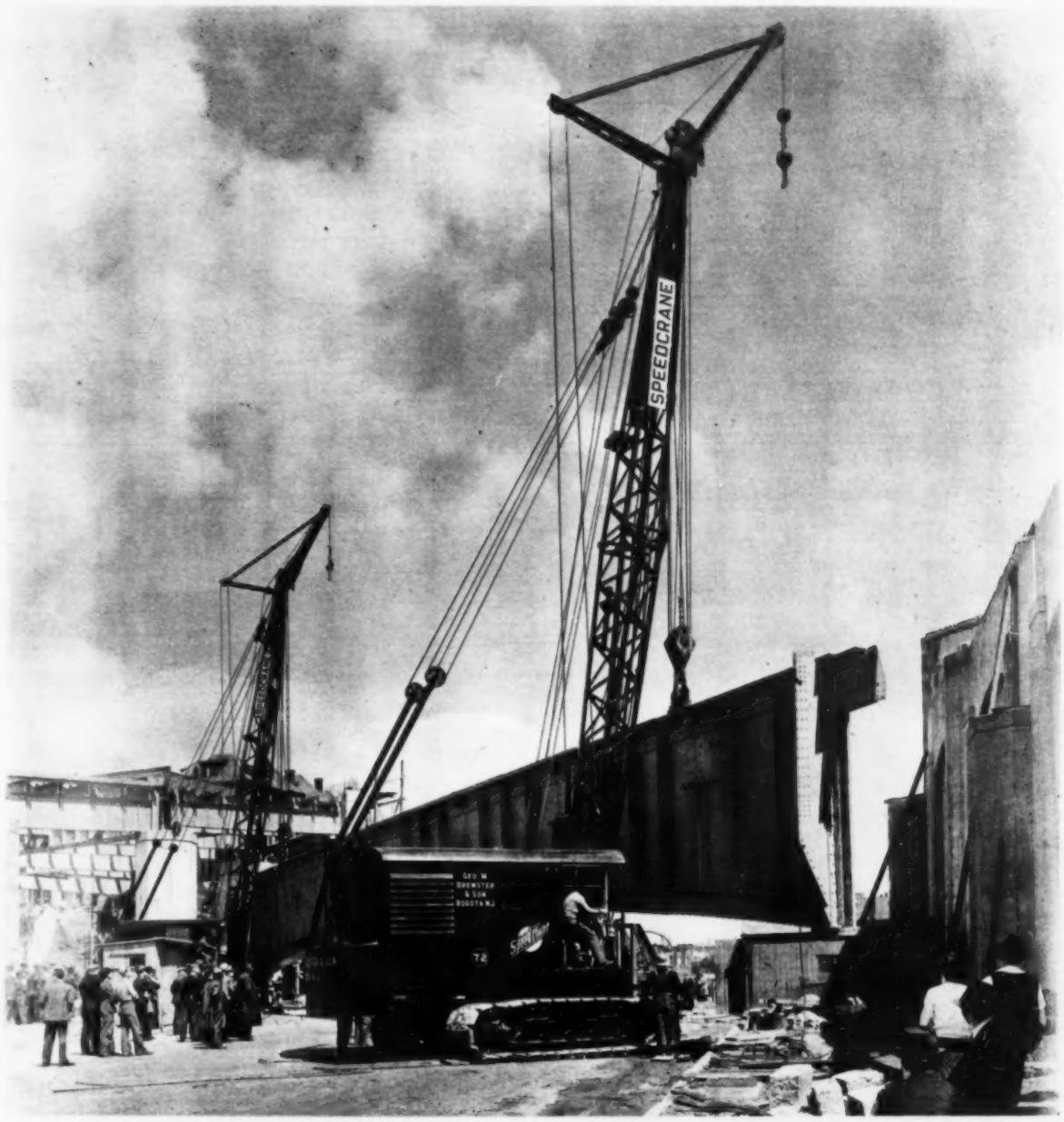
transported in vertical position, ten were arched-flange girders which had to be shipped with the two ends supported in well cars to obtain vertical clearance through tunnels and under overhead structures en route.

Because it was impossible to turn the long girders at any point in Weehawken, they were forwarded from the fabricating shop in predetermined direction for hauling and erection. Out of the railroad yard the girders were hauled up an earth road which climbs a 4 per cent grade and makes a sharp turn. The forward end of each girder rested on an eight-wheel gooseneck trailer attached to a powerful truck, and the rear end was carried on a special sixteen-wheel trailer. Both trailers incorporated the Bigley Bros. patented rocker-axle construction which keeps all wheels in contact with the ground. As an important aid to erection, the truckers spotted their loads close to the bridge seats and parallel with the final position of the girder.

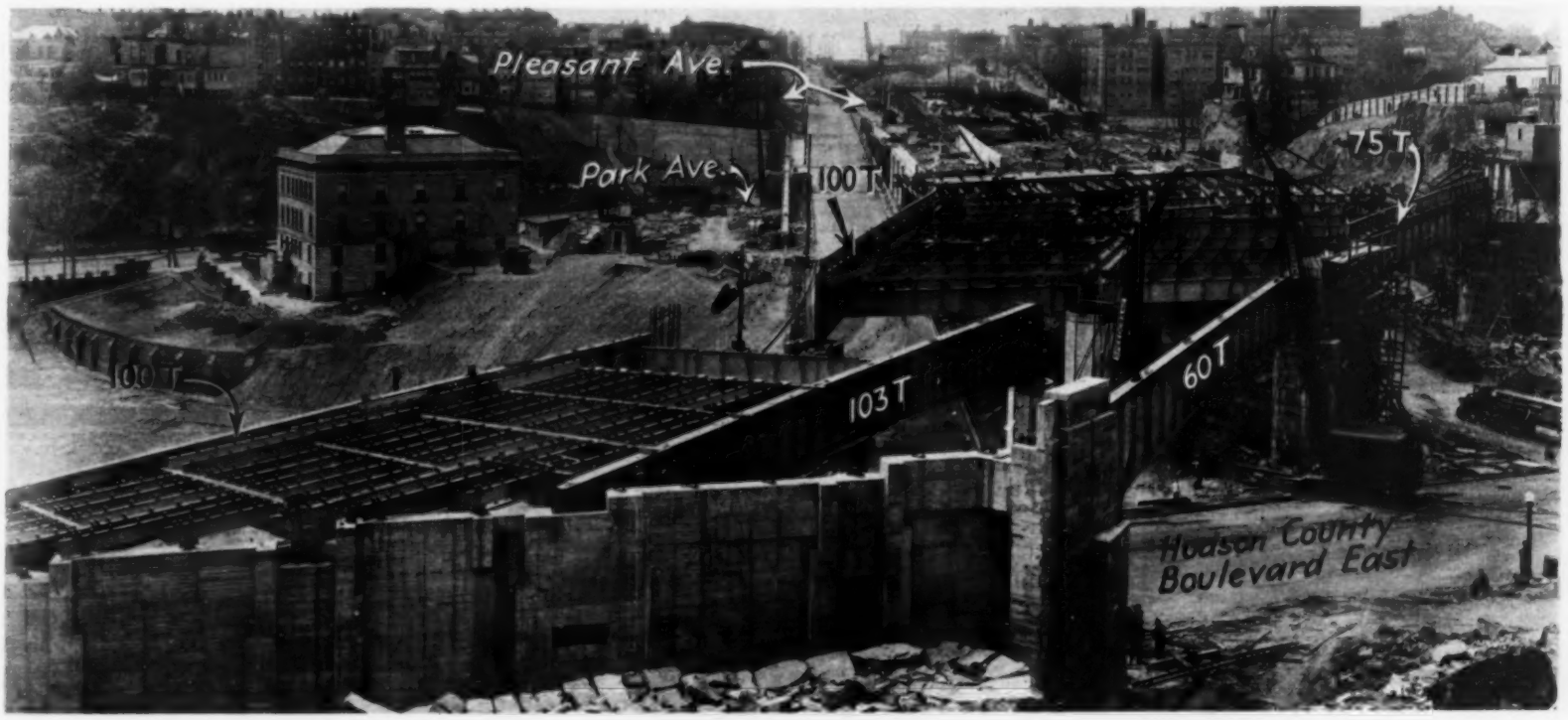
Two tractor cranes picked each girder off the trailers and walked in unison toward the bearing points, stopping to raise the member clear of the bridge substructure before moving the additional short distance for lowering on to the bridge shoes. The entire process took 20 to 30 min. Time schedules of the trucker and erector were coordinated to permit hauling and erection of two 100-ton girders in a single day.

Boulevard Bridge — Five large arched-flange girders, shown in erected position in an accompanying photograph, carry the tunnel approach highway across Hudson County Boulevard East and an adjoining

(Continued on page 61)



TWO 50-TON CRAWLER CRANES pick up 103-ton girder at bolted hitch connections 14 ft. from bearing points and walk it toward final position. Cranes, equipped with 50-ft. booms, raise girder to height of about 35 ft. to clear bridge substructure before moving member into final position for lowering on to shoes.



FIVE ARCHED-FLANGE GIRDERS ranging up to 141 ft. in length and 103 tons in weight, are erected in boulevard bridge by two 50-ton cranes.

IMPROVED FORM DESIGN

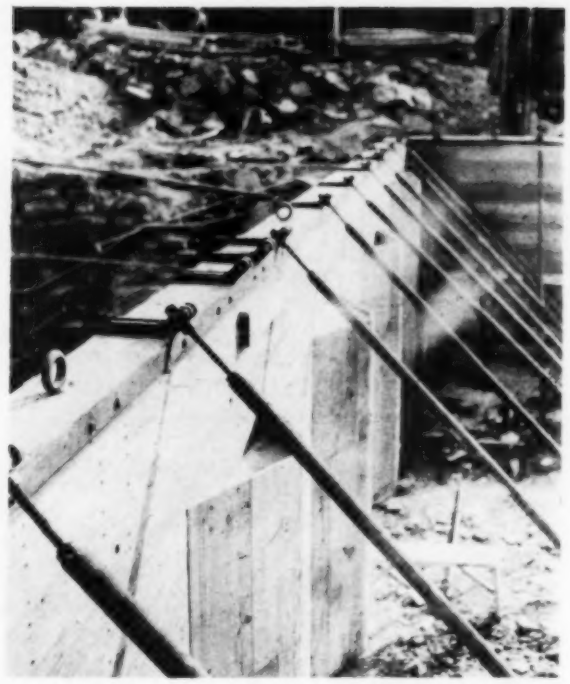
Reduces Costs at Chickamauga Dam

By JAMES B. HAYS,

Construction Engineer,

Chickamauga Dam, Tennessee Valley Authority

TYLOOP ANCHORS hold form panel against vertical face of concrete. Upper anchor is in position to be buried in concrete; lower Tyloop, with lag screw, is hanging on nail.



PIPE STRUTS hold form at top, replacing usual rod and brace. Lag screws anchored to top lugs are threaded into Tycoils in pipe struts.

LUGS welded to cap channel on form panel hold top bolt which screws into pipe strut. Extra bolt, with lag threads visible, lies to left of lugs on channel wale.

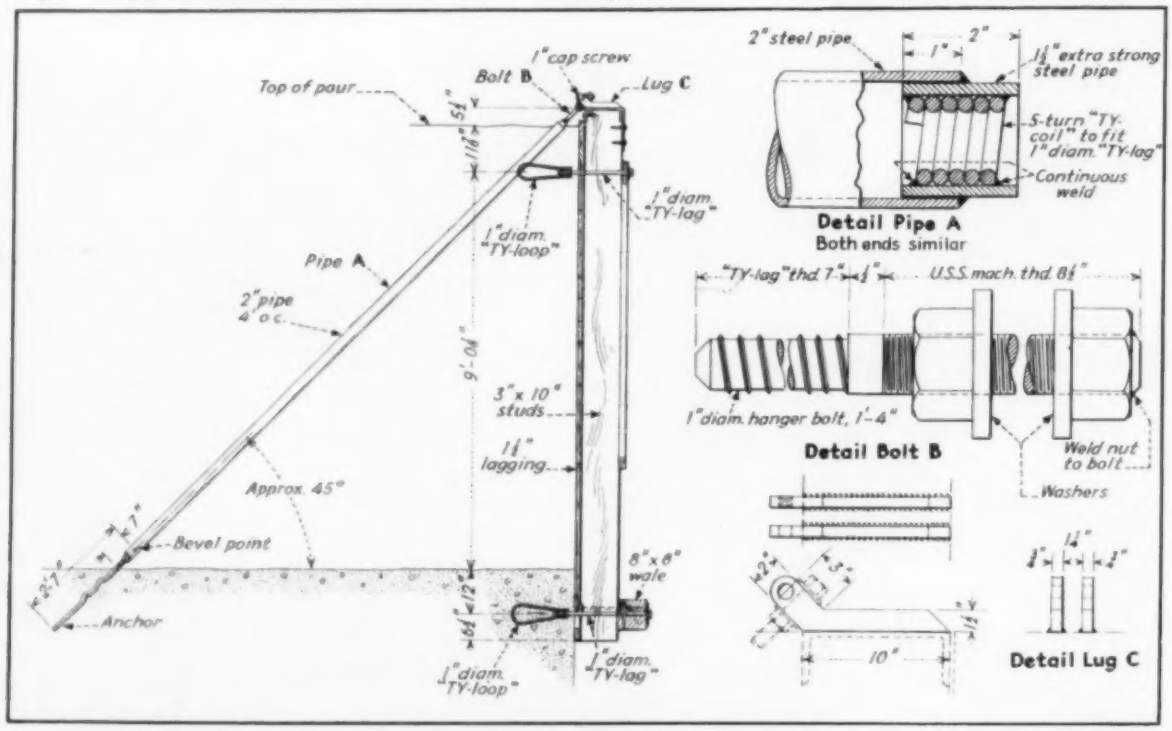
HANGER BOLTS at top of form, remaining exposed after 10-ft. concrete lift has been placed, are easily unscrewed from pipe struts preparatory to lifting form. Lifting chain of ratchet hoist has been hooked to eyebolt for raising form.

A NEW TYPE of panel form that shows lowered costs in erection, stripping, maintenance and hardware has been designed and put into use in the construction of the lock at Chickamauga Dam. Forms of this type are designed and built for a single course of 10-ft. lift. The single-course forms are readily stripped and erected by hand-operated ratchet hoists on A-frames fabricated of aluminum to combine maximum strength with minimum weight. Unique features are found in the method of supporting the forms.

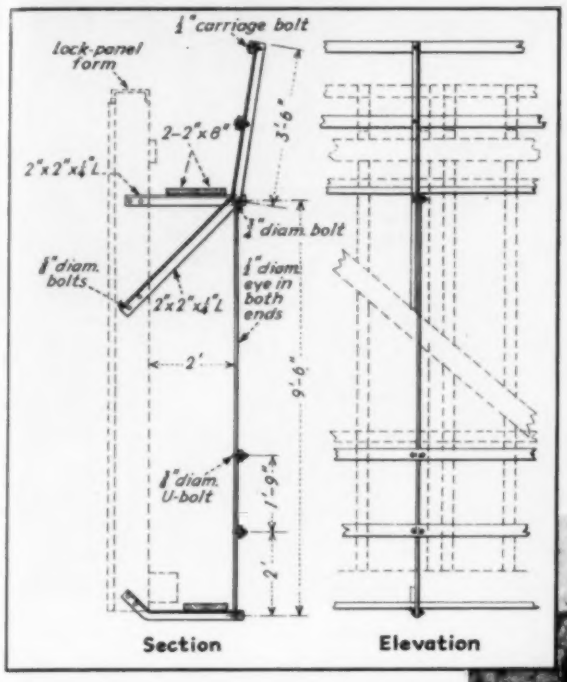
Advantages — Forms of the new design are readily handled without the use of cranes or other expensive equipment. Repair costs are negligible. There are no form rods to be burned off leaving unsightly spots on the concrete. Few new bolts are required, and, by greasing the threads, bolt removal is quickly accomplished. Built-on scaffolds, desirable from a safety standpoint, have proved to be a good investment by saving time in bolt removal and replacement.

Construction with single-course forms reduces the total form area required and permits many re-uses. To overcome the necessity for holding forms on concrete for a long period to retain moisture, a water pipe with spray nozzles is attached to the bottom of the form to keep green concrete wet.

Preliminary Studies — As a preliminary to designing the new forms studies were made of different types of form supports in use. Because of the high lift to be used (10 ft.) it was necessary that *all* parts be adequately designed. The usual type of form rod with a hook at the lower

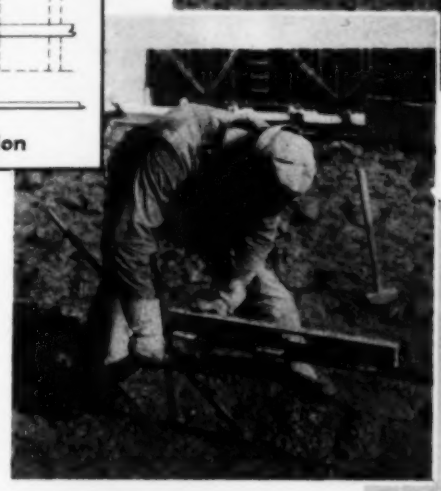


PANEL FORM anchored by lag screw into Tyloop at bottom and by pipe strut to special bolt at top permits ready removal and raising to position for next lift. Both ends of strut are fitted with Tycoils in 1½-in. pipe (Detail A) to take threads of Tylag screws.

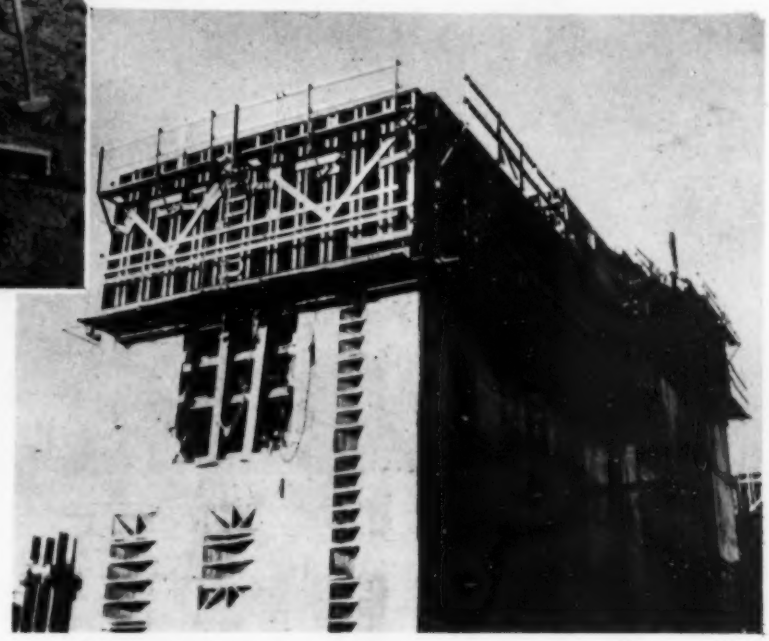


SAFETY SCAFFOLDS permanently attached to form panels prevent accidents and facilitate concreting and form-handling operations.

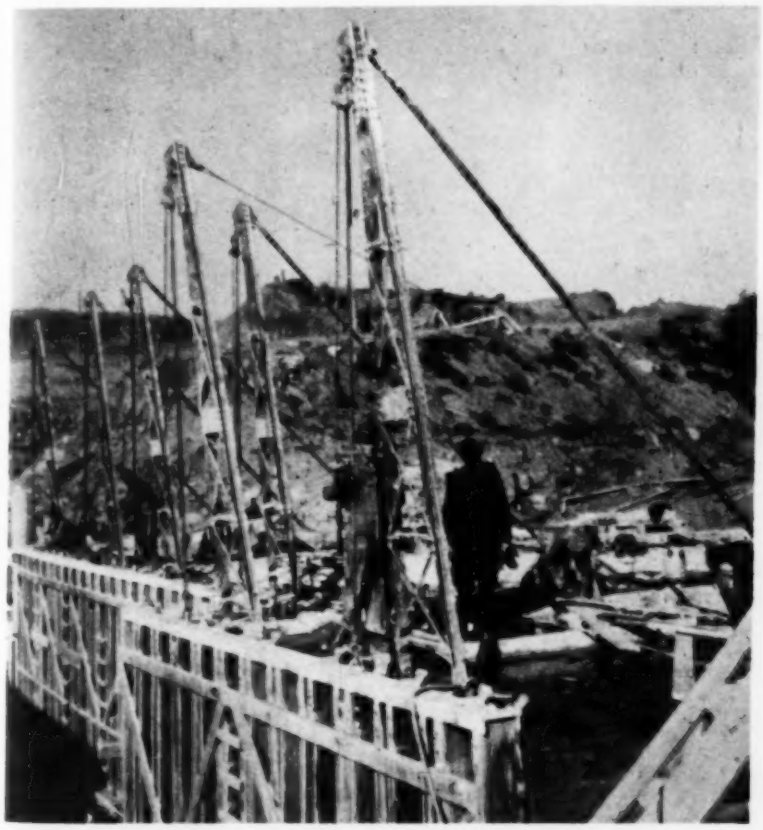
TEMPLET set at right angles to form locates position of form anchor, which workman is driving into concrete at spot indicated by 45-deg. pointer.



TO LOCATE POSITION of form anchor, man levels templet and clamps it to vertical support. Adjustable 45-deg. pointer indicates exact location of anchor.



FORMS IN USE on concrete block of Chickamauga lock carry built-on scaffolds which provide safe walkways and working platforms.



COMPLETE SET of panel forms for one side of concrete block is lifted and set as unit by battery of aluminum A-frames equipped with ratchet hoists.

end was looked on with suspicion because there were many instances of forms giving way for no apparent or visible reason except that hooks might have straightened out. Rods extending through forms at an angle were known to prevent ready removal of the panels. Where sleeve bolts were used there was trouble in removing them, and often forms would be pulled off over them with much damage to the form, thereby increasing repair costs.

One possible objection to sleeve bolts was thought to be in the type of thread used. The machine bolt thread becomes easily clogged or is otherwise made unusable by rust. For this reason a coarse thread, 3½ per inch, of the lag screw type was chosen for this work. The main form bolt was brought through the top of the lift to the form rather than through the side of the concrete, making removal of the bolt quite simple.

Panel Design — An accompanying drawing shows a typical section of a standard panel form. The usual heavy wale is omitted at the top, where a 10-in. 21.9-lb. ship channel is substituted, set over the top of the studding. A timber wale is placed at the bottom, where the form is bolted tight to the previous lift of concrete. Richmond Tyloop anchors are used, consisting of a coil of small-diameter rod fashioned into a coarse thread into which a lag screw fits. These coils are welded to two loops of rod which anchor them securely into the concrete. The Tyloop anchors are accurately spaced vertically.

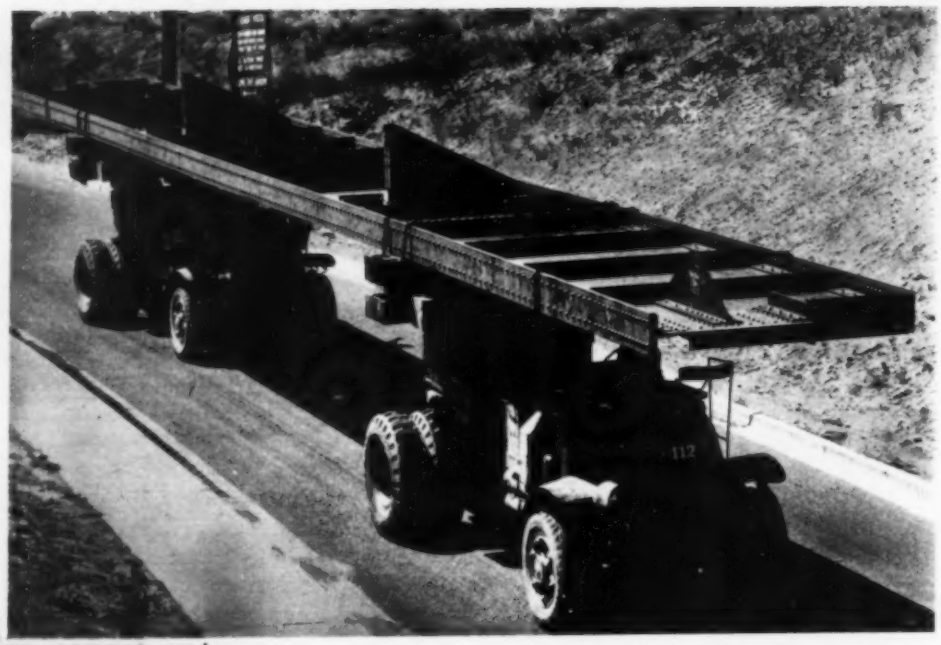
To rest the full weight of the form on the lower bolt, an angle is used, as shown at the top of a slot left in the sheathing. The single strip below the slot acts as a spacer. A horizontal slot 2 in. long, through the wale and bolted-on washer plate, allows sufficient leeway to adjust the anchor bolt or lag screw to the hole. To prevent losing these lag screws, they are left in the form and held clear by a spe-

(Continued on page 64)

How They Did It

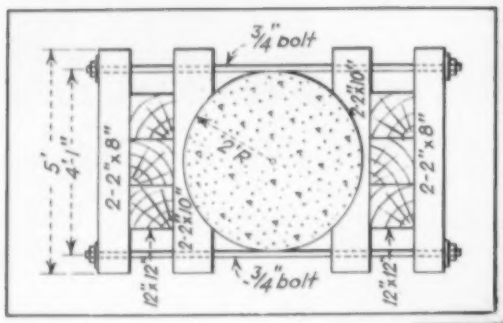
CONSTRUCTION DETAILS

For Superintendents and Foremen



TWO TRUCKS equipped with timber cribs on pivoted supports above rear ends of their chassis carry 38-ton girder 70 ft. long and 8 ft. deep in horizontal position from Grand Coulee freight yard through three towns to position for erection in trestle being constructed by Consolidated Builders, Inc., 180 to 205 ft. above present concrete to raise Grand Coulee dam to final height.

TO CLEAN CAST-IRON PIPE (left) of ½-in. lining of mud and lime accumulated during 21 years in service, before relaying pipe in new main, Springfield, Ill., Water Department utilizes 24-in. rotary cleaning brush made up of wire hand brushes bolted to old brake drums, entire unit being revolved by pipe handle chucked into slowly operated air drill.



TIMBER UPRIGHTS bolted to cylindrical reinforced-concrete columns **(right and above)** support steel framing under forms for concrete arched girder spans being built by Poirier & McLane Corp., New York, on New Jersey approach to Lincoln Tunnel. Two men strap double set of 12x12-in. uprights to column with minimum of carpentry work. On top of uprights are placed transverse I-beams carrying longitudinal I-beam stringers on which 8x12-in. timbers rest. — Photo by R. A. Wurgel.

TIMBER RETAINER (right) used by Memphis, Tenn., Engineering Department permits placing excavated material on busy sidewalk while keeping sufficient width open for pedestrians **(below).** Made up of rough 2x10-in. planks, structure can be quickly and economically dismantled and reassembled at new location.—Photos from J. L. Morris, Goodwyn Institute, Memphis, Tenn.

WANTED—

Photos of Details

The Editor of Construction Methods wants photographs or sketches illustrating interesting **DETAILS** of method or equipment and will pay for those he finds acceptable for publication.

Hasn't your job produced some **DETAIL** that might be illustrated on this page? Send along a picture of it; we'll return it promptly if we can't use it.

TO WET BROOM, preventing broken straws and excessive dust, Highway Engineering and Construction Co., Washington, D. C., mounts 75-gal. water tank on tractor-broom unit **(left).** Outlet valve to sprinkler pipe is controlled by lever running back to tractor operator. Chain pick-up on same unit raises broom clear of pavement when moving to new location.

HIGH-PRESSURE BRAKING POWER to stop heavily loaded Mack AC truck traveling hilly roads for New Riverside Ochre Co., Cartersville, Ga., is obtained by mounting salvaged oil hoist pump from old dump truck to one side of Cummins four-cylinder diesel engine with which working truck recently has been repowered. Pump, driven by belt from fan shaft, can supply 300-lb. pressure to master brake cylinder. To avoid overloading by powerful pump, bypass valve is set just below point at which brake rod will snap.

POWER SUBGRADER (left) drawn by truck or roller rides on timber header forms and trims subgrade for 4-in. asphalt base 23 ft. wide laid behind machine on 15-mi. contract of Griffith Co., Los Angeles, about 20 mi. south of Bakersfield, Calif. Machine, built by Lewis & Shults, has motor-driven scraper chain which casts excess material on shoulder outside forms.

Nine Steel Riggers Erect 718-Ft. Radio Tower In 72 Working Hours

SECTION BY SECTION. shop-welded tubular units of 718-ft. tower are hoisted to position for bolting at three corners of triangular spire only 5 ft. wide.

A SLENDER STEEL TOWER 718 ft. high, made up of 32 three-cornered welded tubular sections measuring only 5 ft. across, forms the central vertical antenna of the Westinghouse Electric & Manufacturing Co.'s new radiating system for station KDKA at Saxonburg, Pa., 20 miles north of Pittsburgh. A crew of nine men erected the tower, claimed to be the highest welded structure in existence, in 72 working hours, bolting the sections together, as indicated by accompanying photographs. Surrounding the tall tower is a circle of eight 90-ft. antennas designed to suppress interfering waves normally emitted in radio transmitting.

Two sets of long steel guy ropes hold the antenna upright. The tower's total weight of 60 tons rests at the base in the ball-and-socket joint of a porcelain insulator, 3 ft. high, capable of supporting the tower and 20 tons additional load imposed by the pull of the guys. The insulator was pretested under loads of more than 100 tons. About half-way up the spire, three smaller sectionalizing insulators were installed to break the antenna, electrically, at a height of 336 ft. Insulators also were inserted in the guy wires to eliminate radiations from this source and conduction of current to the ground.

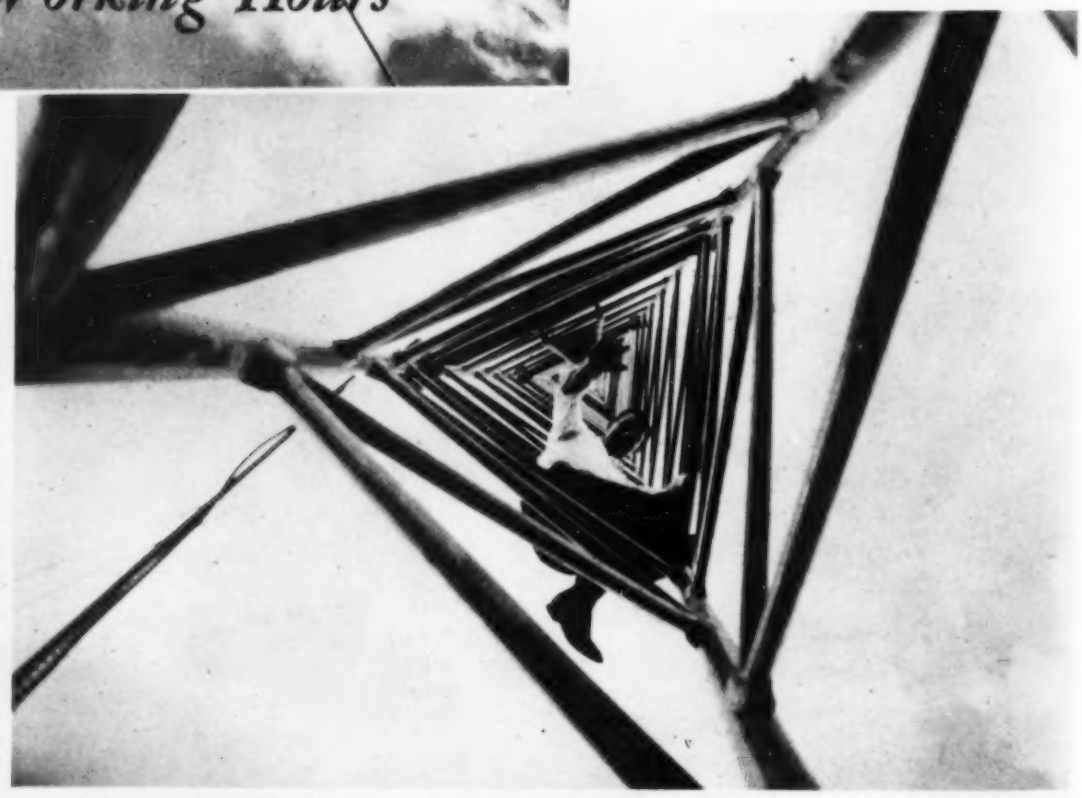
To improve the conductivity of the ground around the antenna, 50 mi. of copper wire was buried 1 ft. under the surface, radiating out, 1 deg. apart, for 700 ft. from the tower.

Original Antenna — An original vertical antenna at the same site buckled and fell when it had been erected to a height of 644 ft. After this collapse, all parts for the new spire were subjected to tests before being accepted for erection.

Guy Cables — Guy anchorages are set in concrete piers 400 ft. from the base of the antenna. Two sizes of cable are used, that supporting the upper section being 1-in. wire rope prestressed to 52,000 lb. and that for the lower section 7/8-in. cable tested to 41,000 lb. The top guys connect to the tower at the 526-ft. level and the lower at 270 ft. Forged steel turnbuckles, used to take up the cables, are capable of resisting 100,000-lb. pulls.

Antenna Base — At the base of the antenna, the bottom section tapers to a tip less than 18 in. wide, forming the peg on which the 718-ft. structure rests, permitting the tower to sway slightly under stress. Use of tubular members in the tower reduces wind loads. A concrete pier 10 ft. wide is the supporting foundation under the insulator.

Antenna System — Known as a suppressor-type ground-wave radiator, the new antenna system possesses all the desirable features of a modern vertical radiator and avoids the weaknesses of fading and poor program reception in certain areas by the ring of shorter antennas about the main radiator. The vertical antenna radiates both sky and ground waves. When two waves meet in areas of varying distance from the station they interfere with each other. The ring of 90-ft. antennas radiates skywaves but in

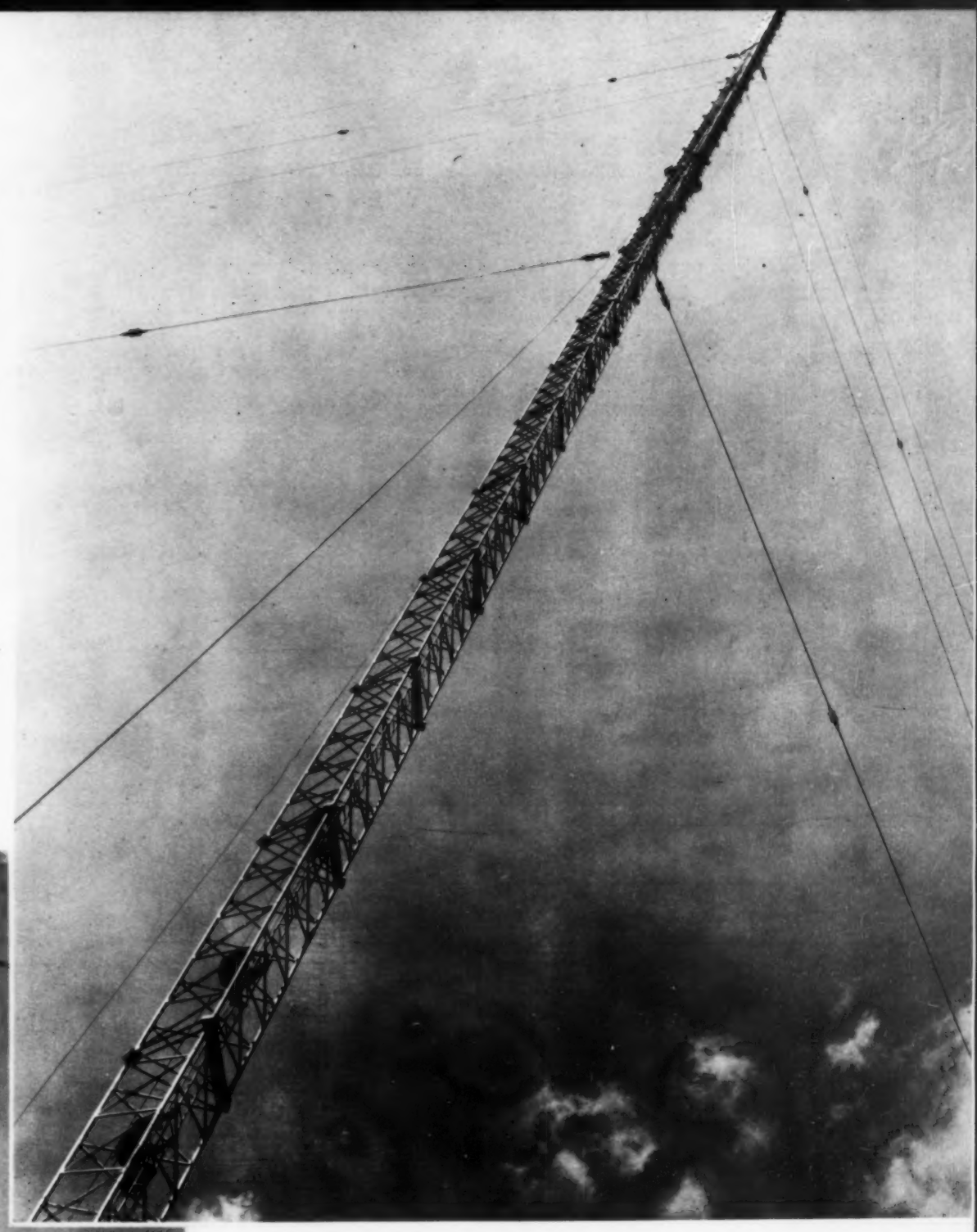


TRIANGULAR STRUCTURE has welded tubular cross-bracing between legs on three sides of prefabricated sections. Bolted flange joints connect tower legs of adjoining sections in vertical spire.

opposite directions to nullify the effect of sky-wave emitted from the main antenna, thus removing the fading zone to great distances from the station.

Vertical Radiator — Exceeding the height of most vertical radiators, the new tower at Saxonburg is three-quarter wave length, — in other words, its height is equal to three-quarters of the KDKA broadcasting wave length. Because the tower is sectionalized by insulators at its approximate center, in addition to being insulated from the ground, it can be fed radio frequency power across the sectionalizing insulators. By such an arrangement it is possible to keep the current in phase throughout the length of the tower, in spite of the fact that the phase normally reverses itself every half wave length, giving a better radiation pattern and greater ground-wave radiation efficiency than can be obtained by the one-half wave vertical radiators commonly in use today.

KDKA's new antenna system gives primary broadcasting service over an area ten times greater than that previously provided with radio signals from this station, which has gone through a succession of improvements since it sent out the world's first broadcast on Nov. 2, 1920.



CLIMBING HIGHER each day, steel erectors make only one trip to top of tower in morning, remaining there until day's work is completed in late afternoon.

ERECTORS start morning climb by working their way up through tapered bottom section to ladder inside triangular tower.

TO LAY 50 MI. OF WIRE in 700 ft. lengths radiating from base of antenna, **(below)** tractor draws plow cutting furrow 1 ft. deep and feeds copper wire from reel mounted at rear.

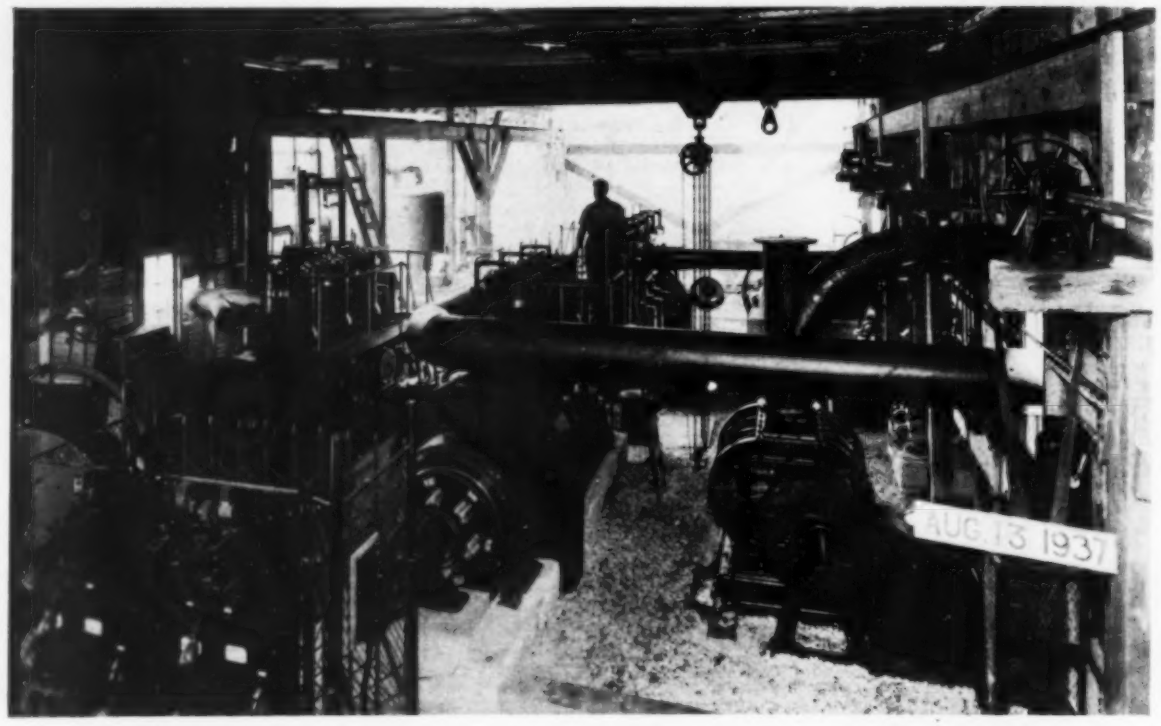
DIESEL ENGINES

Supply Power for Driving

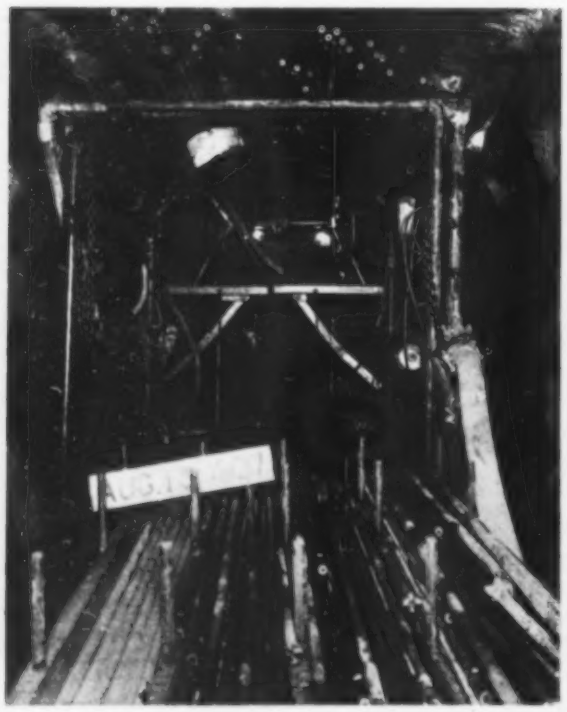
7-MILE ROCK TUNNEL

A TOTAL of 2,720 hp. in diesel engines driving compressors, blowers and electric generators is an outstanding feature of the construction plant installed by the J. F. Shea Co., Inc., Los Angeles, to excavate and line a 7-mi. rock tunnel between Loch Raven dam and Montebello filters for the Bureau of Water Supply of Baltimore, Md. Tunnel excavation is carried forward at six headings driven from three shafts and one portal. Simplified handling of drill steel from a central forging shop and use of tubular drill jumbos which feed air and water to wet drifters through pipe members of the carriage frames assist the drill runners in speeding work in the headings. Mobile California switches provide passing tracks where needed, and swinging panels, at the front of the drill jumbos, which can be swung aside to let trains pass through the carriages facilitate hauling inside the tunnel.

Supplementing an existing tunnel, mostly unlined, completed between the same points about 60 years ago, the new bore is located some distance from the present conduit to avert danger of simultaneous breaks and to avoid as much as possible a limestone formation in the Gunpowder Falls valley at the upper end of the two tunnels. For practically its entire length, the new tunnel penetrates Gunpowder granite, a hard, dense rock which shatters well and pulls without excessive overbreak. The tunnel is circular, with a finished diameter of 12 ft. inside the lining. For almost 23,000 ft. of its length, the tunnel has a minimum 6-in. concrete lining. On the remaining sections, where the hydraulic gradient rises above the surface of the ground, a total distance of 11,650 ft., the tunnel walls are reinforced with a built-up lining comprising a minimum 4 in. of concrete, 2 in. of grout, ½ in. of steel plate pipe, and a final 1½ in. of Gunite inside the steel pipe. Beyond the portal at the upper end of the conduit, the tunnel is connected with the existing line by 2,100 ft. of steel plate pipe 10 ft.



POWER PLANT at portal has three 180-hp. diesel engines driving two 125-kw. generators and one 1,150-c.f.m. cross-compound compressor. In right foreground, blower of 5,000-cu.ft. capacity is connected by silent chain drive to 50-hp. electric motor.



DRILL CARRIAGE (left) of welded tubular construction supplies air and water through pipe framework to five wet drifters. Heavy bull hose at right connects with compressed air line. Sorted steel sizes on car in foreground are transported in this condition without handling from drill forging shop to heading.

SURFACE PLANT at Louise shaft has four 160- and one 200-hp. diesel engines driving two air compressors of 2,200-c.f.m. total capacity and three 125-kw. d.c. generators. At left are switchboard panels.

BULL HOSE carries air under pressure from pipe line to drill carriage.

POWER WINCH on truck pulls loaded railway car up ramp and on to truck body. Car is loaded with sorted steel lengths for full drilling round.

SOFT GROUND at portal is timbered for about 200 ft. Miners dig clay with air spades and advance heading by benching method, driving side headings first to set wall plates before excavating and timbering crown. Suspended pipe drains water from dam on bench.

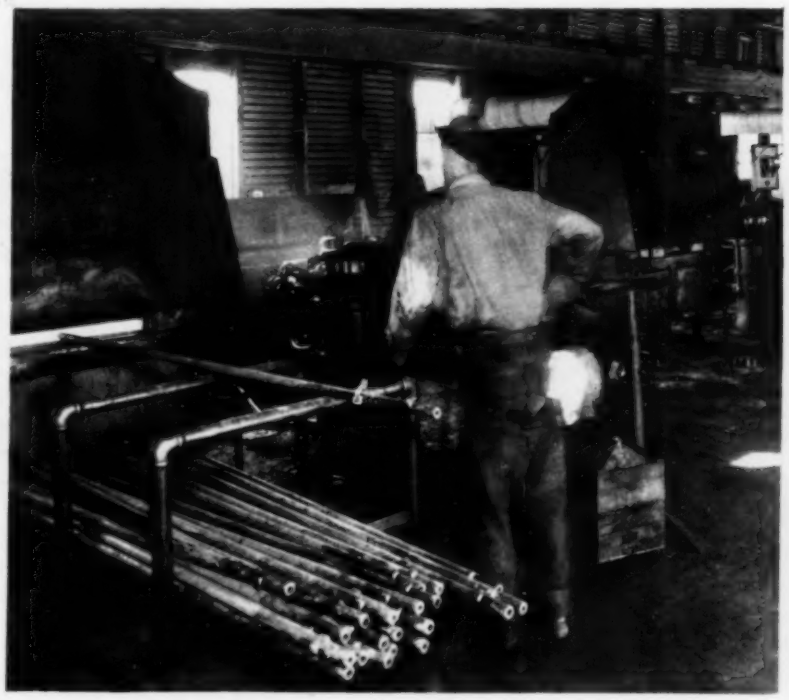
in diameter incased in concrete in open cut, backfilled on top of the concrete.

Construction Plant — Shafts were sunk to depths of 165 to 225 ft. at Montebello filters and at two intermediate points between the filters and the portal. At each of the three shafts and at the portal, the contractor installed air compressors, blowers and generators driven by diesel engines. Blowers have a capacity of 5,000 c.f.m. each. Electric power is furnished by nine 125-kw. d.c. generators and one 125-hp. generator. The diesel engines include fourteen Fairbanks-Morse 180-hp. and one 200-hp.

Only one heading is being driven from the Montebello shaft, but two headings are being driven from each of the intermediate shafts, Louise and Miller. Air requirements at the three shafts and portal are supplied by large stationary compressors belt-driven by diesel engines. At Louise shaft, two compressors with a total capacity of 2,200 c.f.m. are driven by individual 180-hp. diesel engines, with a 360-c.f.m. compressor connected up as an emergency standby unit belt-driven by either of the two diesels. A similar compressor station, involving two units of 950-c.f.m. capacity each and a 360-c.f.m. emergency standby unit, take care of air requirements at Miller shaft. For the single headings at Montebello shaft and at the portal, the surface plants are equipped at each point with one 1,150-c.f.m. compressor belt-driven by a 180-hp. diesel engine. A 360-c.f.m. unit stands by for emergencies.

Each shaft has a steel headframe and an elevator cage operated by a single-drum mine hoist powered by an electric motor. On the surface at Louise shaft, the next shaft beyond Montebello, are the machine shop and drill forging shop for the entire job. The drill sharpening equipment includes three oil-fired heating furnaces with pyrometric-controls, three drill forging machines (air-powered), and two oil-fired heat-treating or tempering furnaces with automatic pyrometric controls.

Drill steel from the six headings is delivered to the forging shop on railway cars hauled from the tunnel shafts or portal on trucks. The cars are run off the trucks on to the tracks of an inclined unloading ramp. Here the steel is transferred to hand trucks to be taken into the shop. After sharpening, the steel is placed according to length on the proper hand trucks. Finally, the sharpened steel is loaded by hand on the railway cars, each car being stocked with steel for a complete round, with the shortest pieces on top and the longest on the bottom. Motor trucks back up to the platform to pull loaded cars on board with power winches, as illustrated by a photograph. The steel is not touched again until it is lifted off the cars by the drillers' helpers in the heading.



DRILL SHARPENING SHOP heats bits in oil-fired furnaces and shapes them in drill forging machines.

Drill Rounds — A full face is pulled in all headings. Drilling procedure depends upon the shift foreman's preference. The job runs three 7-hr. shifts a day five days a week, with 5-hr. or shorter shifts on Saturday to make up the remaining time in a 40-hr. week. An ordinary round uses holes 11 ft. and 9 ft. long. Cut holes ordinarily are drilled with 11-ft. steel, and relief holes, line holes and lifters with 9-ft. steel. Where shifters use only V-cut holes, the drilling is done with 11-ft. steel, and the number of cut holes ranges from five to seven. Hammer holes (inclined downward and upward) are drilled in addition on some shifts, the number ranging from two to five, and steel being usually 9 ft. long but occasionally 7 ft. in length.

At several points where the portal heading struck water, the length of the rounds was reduced to 7 ft. or

VENTILATING CONDUIT for each heading is 18-in. spirally wound 12-gage steel pipe supplied with air from 5,000-cu.ft. blower outside tunnel.

MOBILE CALIFORNIA SWITCH slides on rails of permanent construction track and provides about 200 ft. of double tracks for passing near heading.

5 ft. Elsewhere line holes and relievers have ordinarily been drilled with 9-ft. steel. Number of relief holes ranges from 14 to 21, and number of line holes and lifters from 14 to 23. The average number of holes drilled by the three shifts in the various headings ranges from 44 to 48 per round, and 46 holes is a fair overall average for the entire job. Each round requires the drilling of more than 450 lin.ft. of bore holes, and the average drilling time for a full round ranges from 2 hr. 30 min. to 3 hr. 20 min., depending upon the hardness of the rock and upon working conditions at the face. Allowing no deduction for setting up and for steel changes, this progress reduces to an average drilling speed of 0.45 to 0.60 lin.ft. per minute for each of the five drifters mounted on a drill carriage. The drills are equipped with automatic power feeds.

MUCK CAR, similar to those on track at right, is raised on mine cage into steel headframe, where small auxiliary hoist is used to side-dump car into steel hopper which discharges muck into trucks.

ELECTRIC MUCKING MACHINE traveling on railway track scoops up blasted rock and delivers it to muck cars by belt conveyor.

A 9-ft. round is loaded with 320 to 340 lb. of 60 per cent gelatin dynamite. Rubber blasting plugs are used for stemming, and the holes are fired with ten delays. An average round pulls 8.10 to 8.25 lin.ft. and breaks from 6.2 to 7.4 cu.yd. per foot. Blasting of the rock has required an average of about 6½ lb. of explosive per cubic yard.

Broken rock is loaded by mucking machines into steel mine cars which are hauled out of the tunnel by electric combination storage battery and trolley locomotives. The working schedule calls for completion of a full cycle — mucking, drilling and blasting — for each 7-hr. shift, but delays cut down the average number of shots to about 2½ per day in each heading.

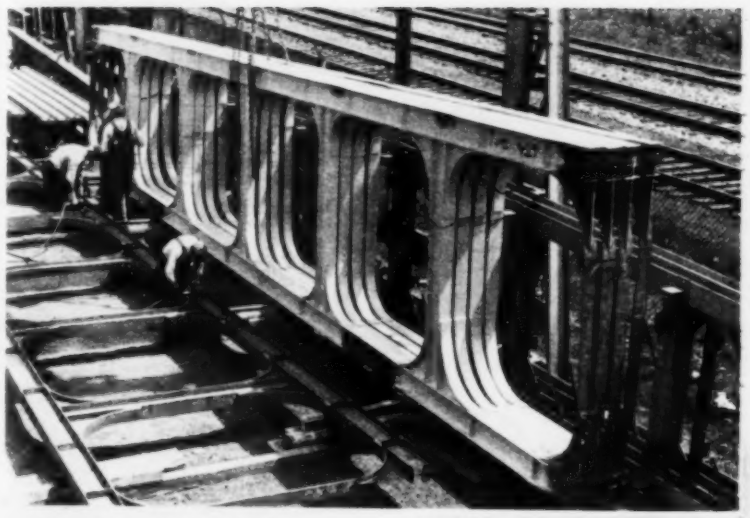
Labor Relations — Employees on the job are completely organized on an industrial (as opposed to a craft) basis by the United Mine Workers, C.I.O. affiliate, and all labor relations are conducted in accordance with realistic verbal agreements between the contractor and agents of the union. The relations to date have been frictionless and satisfactory to both sides. Apparently they aid rather than hinder the efficiency of the job.

Administration — Construction of the Loch Raven-Montebello tunnel is directed by the Bureau of Water Supply of the Baltimore Department of Public Works — Bernard L. Crozier, chief engineer; Leon Small, water engineer; and J. S. Strohmeyer, distribution engineer. All field operations are supervised for the Bureau of Water Supply by John J. Hunt, construction engineer.

For the J. F. Shea Co., Inc., Los Angeles, Calif., contractor, C. J. Kavanagh is superintendent in charge of the work.

WELDED OPEN-PANEL TRUSSES

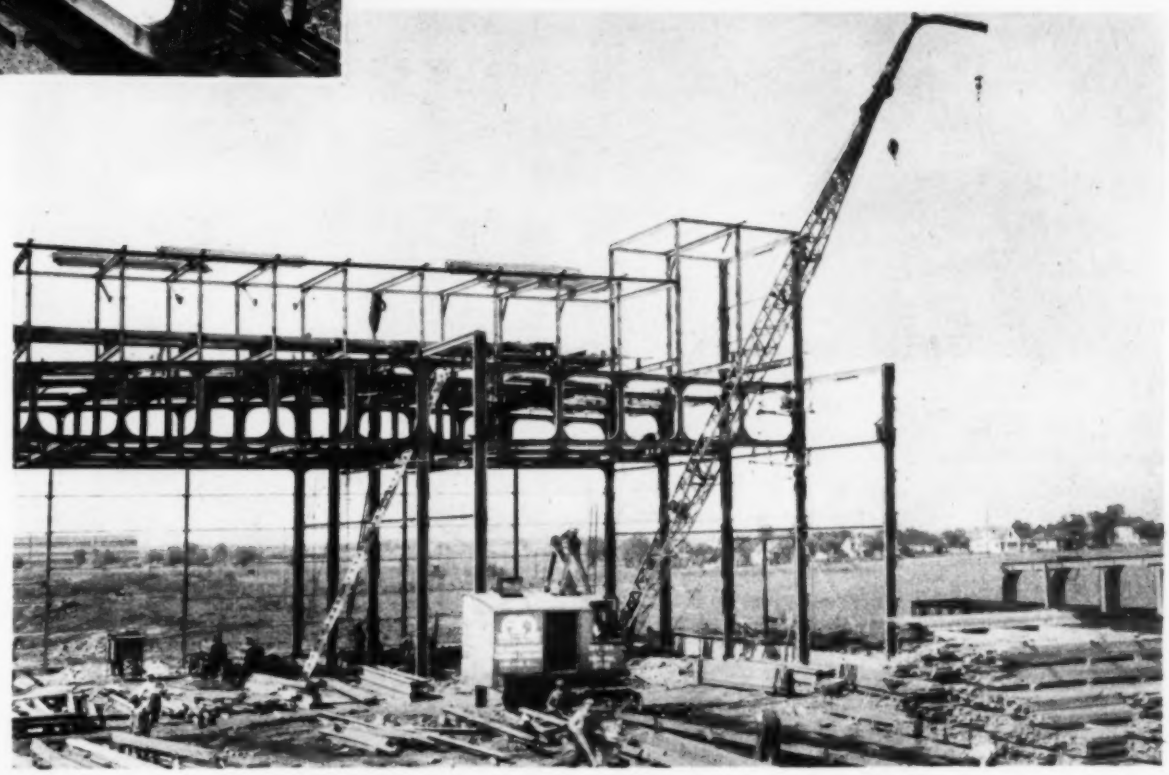
Carry Overhead Tramways In Industrial Building



COMPLETE TRUSS UNITS are prefabricated by welding at Cleveland plant and are cleaned and painted before shipment to Chicago Heights.

WELDED VIERENDEEL TRUSSES, which dispense with diagonal bracing and provide openings for overhead tramways or other service facilities, are a feature of all-welded rigid frames designed and erected by the Austin Co., Cleveland, for a new plant of the International Agricultural Corp. at Chicago Heights, Ill. The trusses, designed with 7-ft. openings between panel points, were completely fabricated in six-panel units at the Austin shops in Cleveland. Of 13,000 lin.ft. of welding required in fabricating a total of 250 tons of structural steel for the building, only 1,100 ft. was welded in the field.

Incorporating functional design in welded rigid-frame construction, the trusses are capable of carrying concentrated loads between panel points. This capacity makes them useful for supporting conveyors, tramways or walkways passing through the portals on top of the lower chords. Monorails likewise can be suspended under the lower chords.

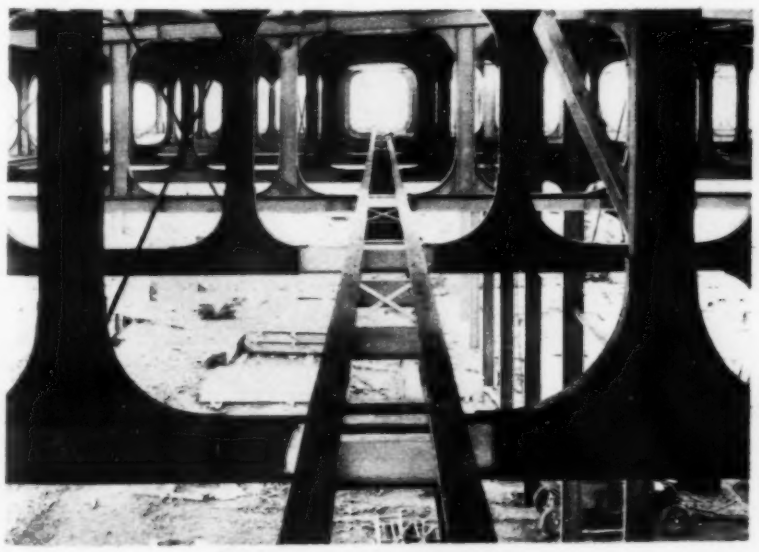


WELDED OPEN-PANEL TRUSSES for rigid-frame structure of fertilizer plant arrive at site in prefabricated six-panel units for erection by crawler crane.

In discussing applications of the trusses, Albert S. Low, vice-president and chief engineer of the Austin Co., pointed out that, while the portal frame is of particular value to industries which require bulk handling of materials, the same construction offers opportunity for efficient installation of air conditioning and other service facilities.

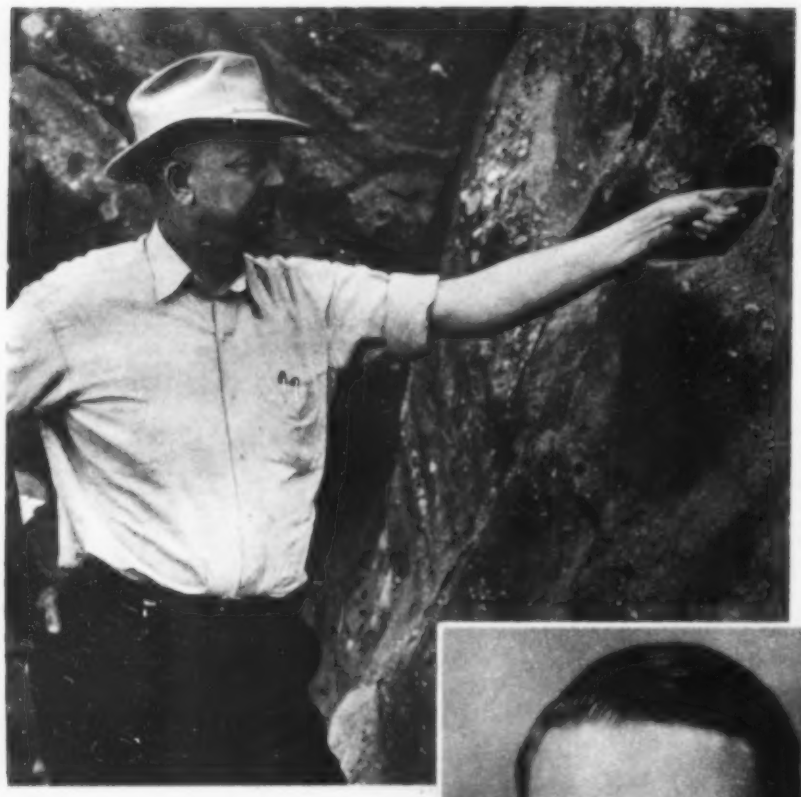
Four overhead tramways, supported on the trusses and running through portal openings, function as conveying tracks in the fertilizer plant at Chicago Heights. Industrial cars operating on the tramway rails are loaded from overhead hoppers to which mixed fertilizer ingredients are delivered by belt conveyors.

After being welded into units at the Cleveland shops, trusses for the Chicago Heights plant were loaded by overhead gantry cranes into railroad cars. At the site, the units were unloaded and erected by long-boom crawler cranes equipped with goosenecks for handling lighter steel. Each six-panel truss spans one bay of the continuous two-span structure.



PANEL OPENINGS in Vierendeel trusses furnish ample passageway for tramways supported by steel stringers framed into bottom chords.

WELDED TRACK SUPPORTS and trusses are loaded at fabricating plant while J. E. FERGUSON, manager of Austin Co.'s manufacturing division, watches operation.



BOULDER DAM BUILDER shifts activities to new construction sector. FRANK T. CROWE, here shown examining foundation rock of Gene Wash dam site, is now general superintendent in charge of work at Shasta dam of Central Valley project, Calif., for Pacific Constructors, Inc. Mr. Crowe directed construction of Boulder dam for Six Companies, Inc. and of Parker and Gene Wash dams for J. F. Shea Co.

ON VACATION from duties as contractor and president of Illinois Contractors' Association, FRANKLYN C. NELCH takes a squint at horseflesh on view at Churchill Downs racetrack, Louisville, Ky.

CENTRAL BRANCH of Associated General Contractors, Des Moines, Iowa, is headed by President HERMAN F. COLE, (right) of Ben Cole & Son, Ames, Iowa.

Present and Accounted For~

A Page of

PERSONALITIES

MAD RIVER DAM. concrete arch structure 28 mi. northeast of Eureka, Calif., is under construction by Hanrahan & Connolly, with G. GUIST (left) superintendent in charge. Others in group are: (left to right) R. E. CAMPBELL, of C. C. Kennedy Co., consulting engineers, San Francisco; G. S. WINGLER, chief inspector for City of Eureka; and J. PORTER, resident engineer for PWA.

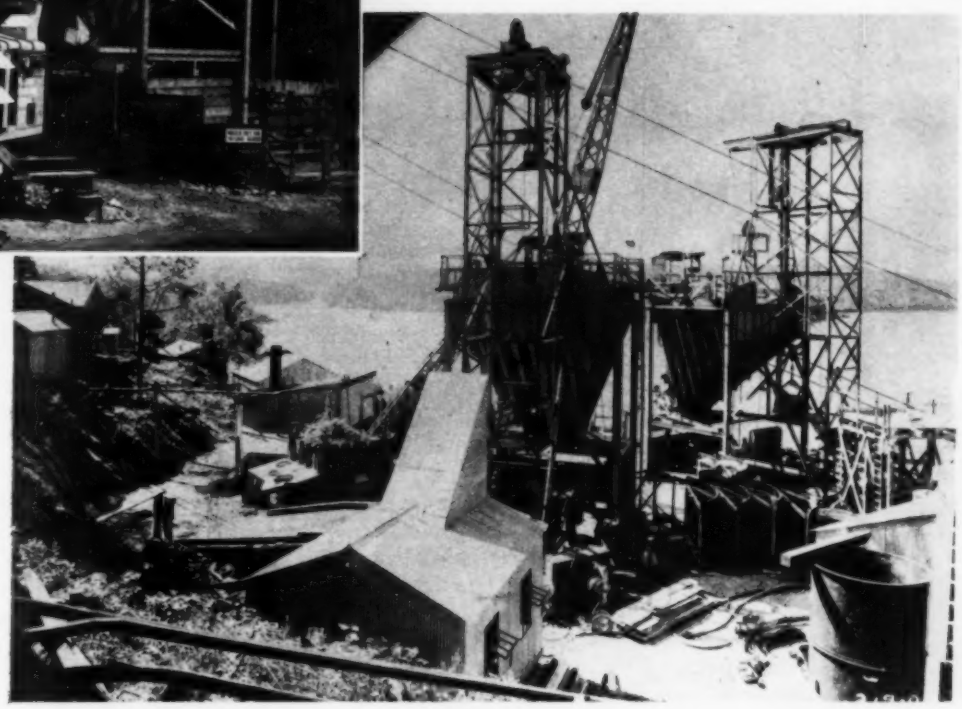
CONSTRUCTION ENGINEER of California Division of Highways, succeeding the late C. S. Pope, is R. M. GILLIS **(right)**, formerly district engineer at Fresno.

Contractor Sinks Thirteen Shafts

320 to 1,550 FEET DEEP

For Delaware Aqueduct

WHIRLER CRANE serves as auxiliary hoisting unit at shaft No. 23, working in combination with headframe hoist to expedite muck removal from shaft.



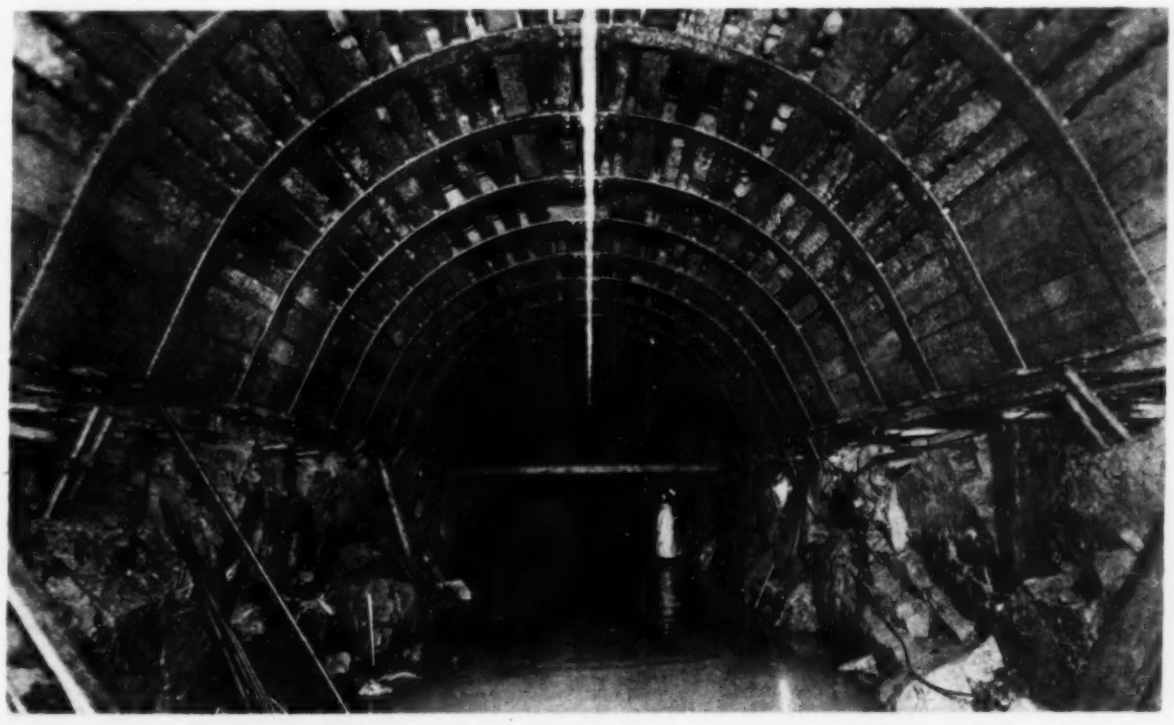
HEADFRAMES AND MUCK BINS over uptake and downtake shafts at No. 17 take care of excavated rock hoisted from shafts and discharged through bins into trucks for disposal. In foreground is shed housing single-drum electric hoist for near shaft.

SOME TIME in 1944, far up in the Catskill Mountains, valves will be opened and into a concrete-lined tunnel, the longest tunnel in the world, will pour millions of gallons of pure, fresh water, beginning an 85-mi. journey to replenish the present supply for thirsty New York City. Thus will be marked the completion of the first stage in the building of the giant Delaware Aqueduct, which, when all stages are completed, will supply Greater New York with an additional 700 million gallons of water each day.

Thirteen Shafts — More than a year ago, the Contracting Division of Dravo Corp. Pittsburgh, Pa., was awarded the first two contracts on this immense project. These contracts called for the sinking of thirteen concrete-lined access shafts along the tunnel route, varying in depth from 320 ft. to 1,550 ft., and in finished diameter from 14 ft. to 19½ ft. In addition, the aqueduct tunnel, which varies from 13½ ft. to 19½ ft. in diameter, was to be excavated to a distance of 200 ft. each way from the shaft bottoms. Work began on February 12, 1937, and for 18 months hundreds of men dug deep into the earth, drilling, blasting, shoveling. In all, more than 8,000 ft. of shafts were sunk and 3,600 ft. of tunnel stubs were driven. All shafts have been concrete-lined throughout and tunnels provided with steel roof support as necessary.

In general, the same construction plan was adopted for all thirteen shafts. Temporary hoisting arrangements were installed for sinking and lining the first 100 ft. of each opening. Beyond the 100-ft. limit, these machines (steam derricks, electric whirlers, or gasoline crawler cranes) were used for general material handling. At the 100-ft. level, steel headframes and muck bins, as called for under the contract, were erected, and Dravo single-drum electric hoists were installed. Sinking progressed in three shifts, one drilling and two

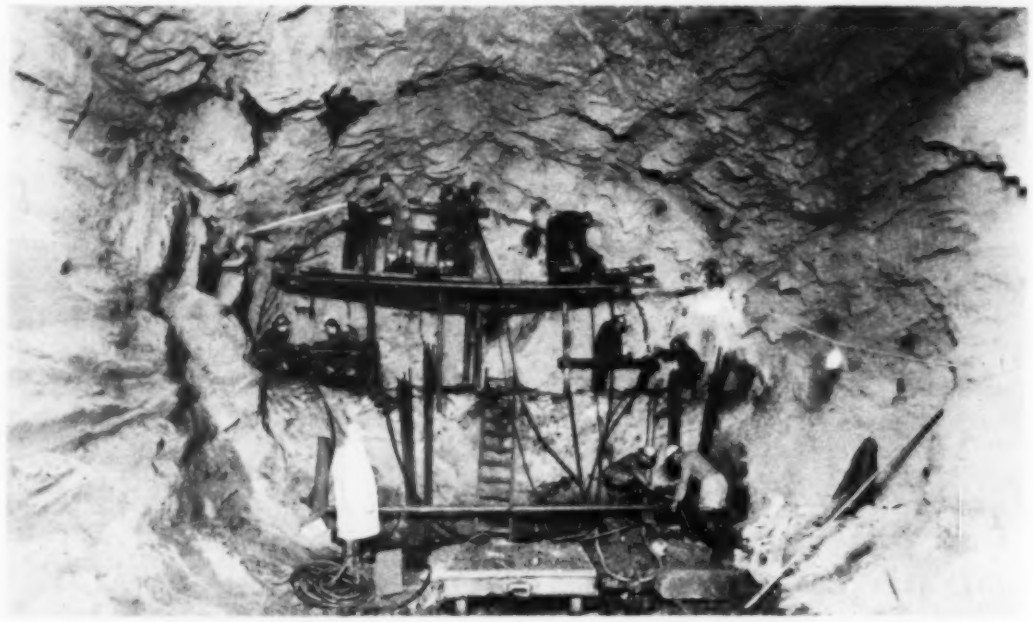
(Continued on page 56)



READY FOR CONCRETE LINING. completed tunnel has roof support of arched 8-in. 40-lb. beams resting on wall plates made up of two continuous 8-in. 18.4-lb. I-beams. Between arched roof beams spaced 4 ft., c. to c. is placed 6-in. timber lagging.

DELAWARE AQUEDUCT

(Continued from page 55)



SIX DRILLS mounted on horizontal bars sink holes in top heading and bench for tunnel of 19½-ft. finished diameter.

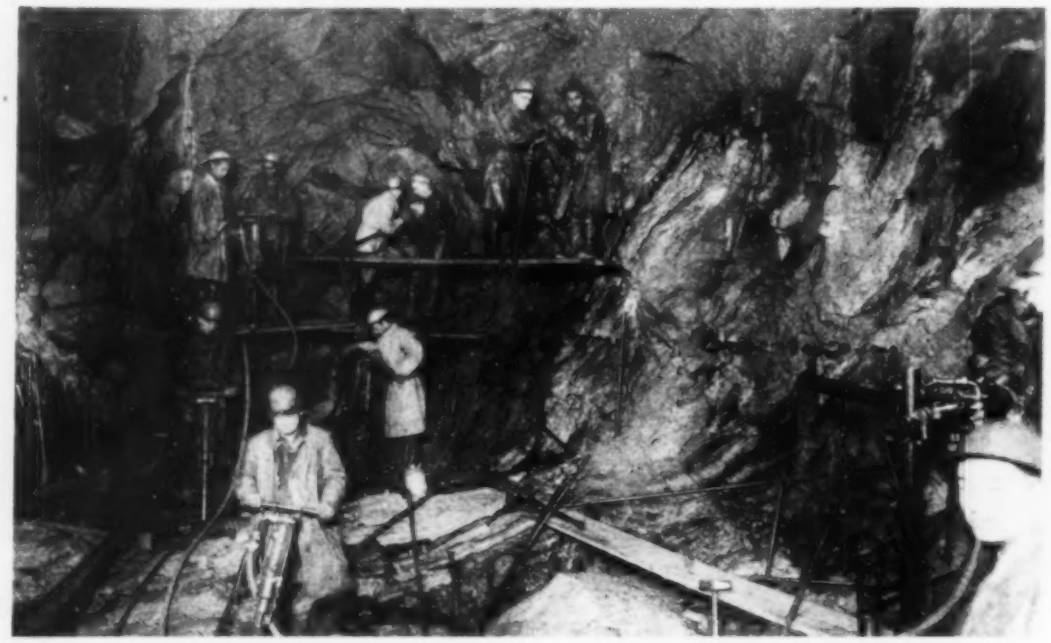
mucking, the number of men being so regulated as to complete drilling, blasting, and mucking one complete round in 24 hr.

Shaft Lining — Concreting followed the sinking as rapidly as possible according to ground conditions. The amount of rock which could be exposed with safety varied from 9 to 75 ft. Special steel forms built by Dravo Corp. in collapsible 8-ft. segmental sections, were used for all lining except special coping and valve chamber sections where the use of wood forms was permitted.

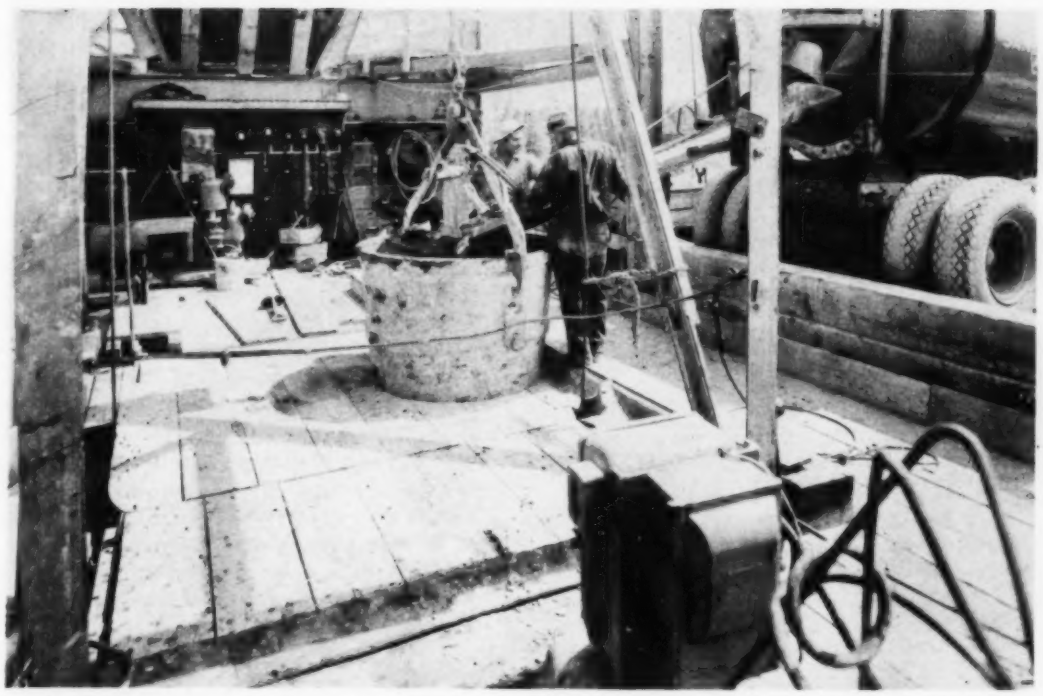
From 8 to 16 ft. of forms was set and concreted, followed by additional pouring in maximum lifts of 16 ft. until the lining closed in on the completed portions above. Concrete was lowered by the hoist in shaft or special bottom-dump concrete buckets, dumped through a chute into the forms and compacted with internal electric vibrators. The lining thickness varied with the depth of shaft from 19 to 29 in.

Tunnel Roof Support — When a shaft had been sunk to its prescribed depth, work was begun immediately on the 200 ft. of stub tunnel to be driven each way from its bottom. After rough excavation, the steel roof supports were erected as rapidly as ground conditions demanded. The type of support adopted consists of 8-in. 40-lb. steel beam ribs, bent to the proper radius and carried on steel wall plates located just above the springing line on each side of the tunnel. Bents were spaced on 4-ft. centers.

Where necessary, steel lagging was installed between the bents. Wall plates were temporarily supported by 2-in. pins set in holes drilled into the rock until permanent 12x12-in. timber posts could be placed. Six pieces of 6x8-in. collar braces were placed between sets with a ¾-in. tierod accompanying each brace. The steel was securely blocked against the rock with radial posts. Longitudinal wood blocking was not permitted. In case



TYPICAL DRILLING CREW enlarges shaft in transition section, where shaft bells out to meet tunnel. Shaft sinking is done with jackhammers.



SAFETY DOOR protects top of No. 18 uptake shaft, where bucket is being filled with truck-mixed concrete. Bucket when filled is lowered through door to forms in shaft.

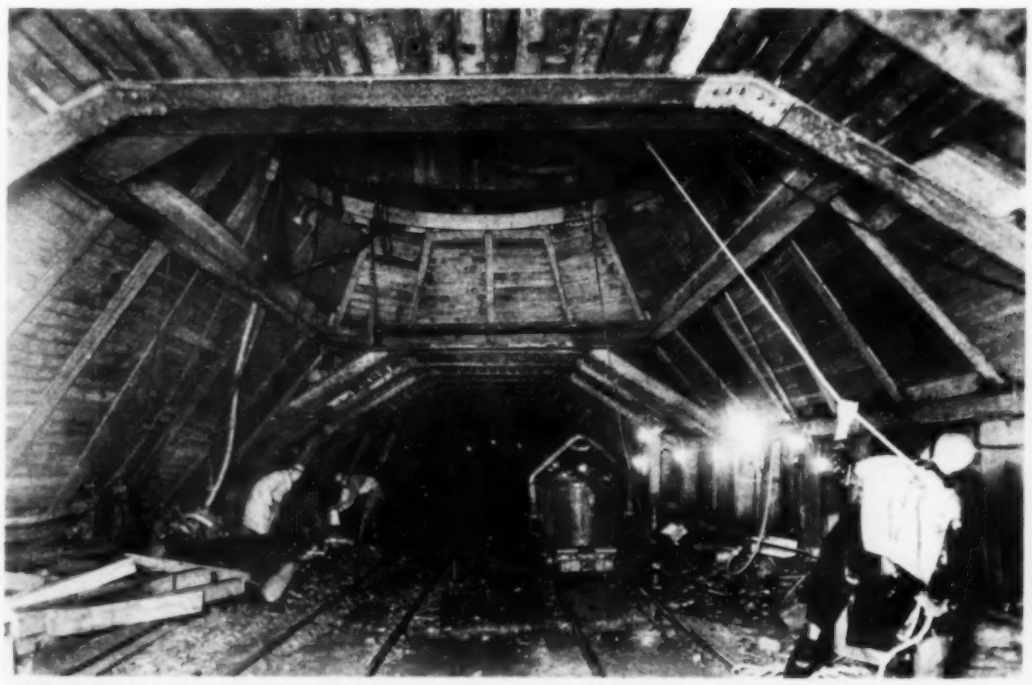
the rock was of such a character that the radial posts would not give sufficient support, solid lagging was installed between the steel bents, and the space between the roof support and the rock was filled with prepared tunnel muck.

In addition to the standard roof support, it was necessary for the contractor to design and fabricate special supports for quarter bend intersections of shafts and tunnels, and for transitions from the enlarged sections at shaft openings to standard tunnel section.

Shaft Grouting — Frequently, water flows of from 10 gal. per minute to 90 g.p.m. were encountered, requiring the placement of grout pipes and frequent grouting operations. In one instance, a 90 g.p.m. flow was struck at a depth of about 390 ft. Holes were drilled 20 ft. deep into the bottom, grout pipe placed, and a 6-ft. concrete mat poured. After the mat had set, grout was placed under 600-lb. pressure and the flow reduced to 4 g.p.m. As sinking advanced, grouting was continued behind the lining. In the tunnels, electric or air pumps removed all seepage.

Caisson Sinking—An indication of the problems arising from various conditions encountered during construction is found in the method required to sink a shaft on the west side of Kensico Reservoir in Westchester County. This shaft, known as No. 18 Uptake, is located on a previously erected earth dike, which is a part of the reservoir boundaries. It was required to strengthen this dike by means of additional compacted fill before beginning excavation, and also to use a concrete caisson to sink the shaft to rock. Specifications also demanded that the design provide for installation of an air deck in the caisson and a seal to rock, the seal to be placed under air pressure if such procedure should be found necessary.

(Continued on page 58)



AT BOTTOM OF SHAFT, contractor starts top heading with five-segment steel roof support. Concrete shaft lining can be seen above steel frame and timber lagging at bottom of opening.

DELAWARE AQUEDUCT

(Continued from page 57)

Outside diameter of the caisson was set at 37 ft. The caisson was constructed with a 3½-ft. wall thickness for the lower half, and a 3-ft. wall thickness for the upper half.

After completion of the dike reinforcement, actual shaft construction was begun, the steel shoe of the caisson being placed and the caisson started down in the usual manner. Excavation was accomplished by clamshell bucket, assisted by hand digging under the cutting edge as far as possible. Concrete was placed in 8-ft. lifts as sinking progressed, until rock was struck. The caisson was ready for sealing off to rock at a depth of 43½ ft. As water seepage was very small, the final seal was made without aid of compressed air.

The uptake shaft at this location was designed to include permanent conduit and pipe lines incased in the lining. Although the finished shaft is circular, of 18-ft. diameter, the excavation line was necessarily egg-shaped to provide space for these lines. Thickness of the lining increases from 25 in. at the top of the shaft to 29 in. near the bottom. Original depth was estimated at 660 ft. Because the tunnel has to pass below the reservoir, test bore holes were made to determine underground conditions. The test holes revealed the necessity of sinking No. 18 shaft and the companion shaft at No. 17 to more than 830 ft.

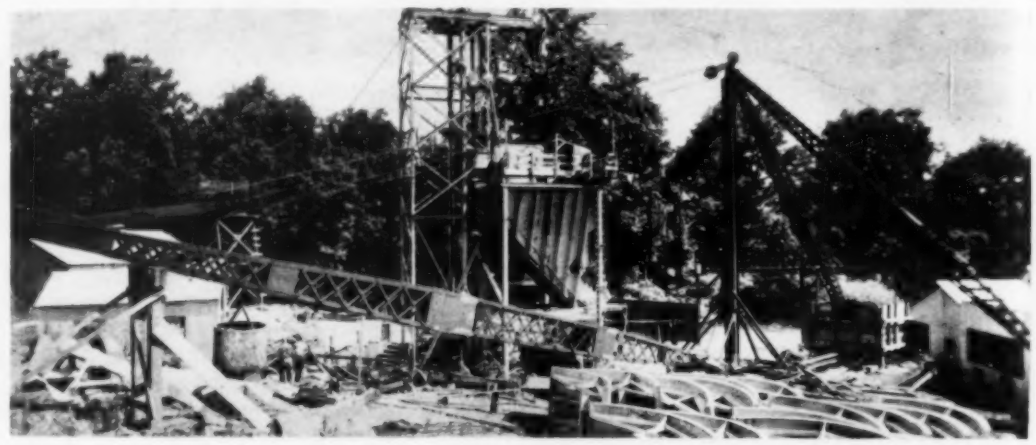
Bad Rock — In many places, the seamy and broken character of the rock affected the stability of the shaft walls. To eliminate the danger of falling rock, it was necessary to concrete short sections in the shaft, and this procedure, of course, resulted in comparatively slow progress. For a distance of 600 ft. below the caisson, pours averaged 24 ft., although many of the sections were only 16 ft. From June to February, 779 ft. was excavated and 755 ft. of concrete was placed. Water flow encountered was often as high as 60 g.p.m. but was held to 12 g.p.m. by pregrouting the rock whenever test holes showed excess water and by final grouting behind the lining.

Drilling and Mucking — In all thirteen shafts, the usual three shifts (one drilling and two mucking) were employed, calling for only one blasting period every 24 hr. A normal drill crew for an 18-ft. shaft consisted of a foreman and nine drillers. The two muck shifts averaged about twelve men per shift, including the foreman. The average round consisted of 72 holes, and as a rule, 225 lb. of dynamite were used per round.

In tunnel work, a typical crew for heading and bench driving comprised six miners, six chuck tenders, one nipper, and a shift boss. About 80 holes and 800 lb. of powder were used to pull a 10-ft. round. Mucking generally was done by air-operated Hoar shovels loading into shaft buckets on flat cars. The cars were hand-pushed to the shaft bottom.

Work continues daily on the tunnel and other shafts along the 85-mi. route, in an effort to complete the first stage of the project as soon as possible. Upon completion, this stage will add 170 m.g.d. to the city's supply. Today, the area supplied by the present reservoir and aqueduct system is taking almost the full capacity of the system.

Future stages of the project call for several new reservoirs on the Delaware River, Beaverkill and Willomok Creeks, and Little Delaware River. These reservoirs will have connecting tunnels leading to the main tunnel now being built, and will provide the remaining 530 m.g.d.



STEAM STIFF-LEG DERRICK at single shaft handles segmental steel concrete forms and serves as standby unit for emergency removal of men.

Improved Rotary Hose

AN IMPROVED ROTARY HOSE made by The Goodyear Tire & Rubber Co. includes among its improvements a third bead wire extending back from each end approximately 5 ft. and built in by a new process.

The hose, designed for service within the 1,500-lb. working pressure range is of 7,000-lb. burst construction and will not readily crush or kink, but at the same time is a super-flexible, high-pressure hose. It has an especially tough compounded rubber tube, and the body structure consists of multiple plies of extra heavy cotton duck and two distinct layers of bead wire spiralled in opposite directions. Each layer of wire is embedded in rubber and carefully insulated from the other by high grade rubber and duck. Cover is of rubber compounded to give maximum resistance to abrasion. This hose is said to be unusually durable for rough rotary service.

Queens Double-Deck Sewer

(Continued from page 38)

piles. Elsewhere the concrete is placed directly on the soil, which is excavated to the shape of the bottom.

An accompanying drawing shows sheeting and bracing for normal ground conditions. In wet clay, where pressures are extremely heavy, spacing of the vertical H-posts is generally 8 ft., sheeting thickness is increased to 6 in., and cross-struts are doubled up, two 12x12's instead of one being used in each of the two bottom tiers shown for a 40-ft. trench. Steel H-posts in bad spots are driven 20 ft. or deeper into the soft bottom, and

WOODEN SCAFFOLD supports arch reinforcement during erection. Concrete spreaders separate two layers of reinforcement at crown, where hangers to overhead struts also can be seen in place.

an additional set of struts is placed below the subgrade. Even with the added strengthening of the trench structure, sheeted walls at some places have moved as much as 3 in., plank sheeting has snapped, and at least one 12x12-in. strut has broken under the load of fluid mud pressures.

Trench cross-bracing is removed as required when setting forms and reinforcing steel. In good weather, forms are allowed to be stripped the second day after a pour, and blocking of 6x12-in. timbers then is installed between the concrete and the steel H-posts to replace the struts. A pair of 6x12-in. pieces with a 3-in. space between them proves more serviceable than a 12x12-in. block when the H-pile finally is pulled. The smaller pieces rotate freely, while 12x12-in. blocks bind and wedge the steel pile, making pulling difficult.

A neat and accurate job of sheeting and bracing is a feature of the entire project. Correct grade

(Continued on page 60)

Queens Double-Deck Sewer

(Continued from page 59)

of the bracing is a necessity, as the outside forms for both barrels depend on trench blocking or struts for support during moving and setting. All H-beams are 12x12-in. 65-lb. and are driven with a McKiernan-Terry 9B3 or a Vulcan No. 2 steam hammer to a resistance of 10 tons. Where ground conditions are such that the pile takes six blows or less to the last foot, there is insufficient lateral resistance at the bottom, and timber struts are required below the subgrade to give stability.

Construction Steps—After placing the invert, the construction crew installs blocking between the concrete and the steel H-columns. The blocking is set at accurate grade to carry a 3-in. plank 6 in. below the top of the construction joint. Using this plank as a runway, the crew moves the outside wood forms ahead on pipe rollers, pulling the forms with a cable running to a small hand winch inside the steel forms. The wood forms are blocked up from the planks to accurate grade for pouring the wall. A beveled mold strip along the inside of the forms, set to form a chamfered shoulder at the top of the wall, demands that these forms be blocked to correct grade.

To furnish bearing for the outside steel forms of the arch, the outer surface of the wall rises straight to the upper construction joint instead of breaking into a curve at the point of tangency between the vertical face and the outside surface of the arch. The stepped shoulder thus formed provides a definite bottom position for the outside arch form, which is blocked laterally against a timber ranger wedged between steel H-section posts. Originally the form was designed to be held by anchor bolts, but the stepped shoulder and blocking are superior.

Heavy reinforcement of 1-in. square bars strengthens all parts of the sewer, the steel requirement being 1,575 lb. per linear foot of structure. Side-wall bars for the lower barrel are placed after the wood outside forms have been moved ahead. Steel inside forms have to be drawn into position before the roof reinforcement of the lower barrel can be set. The inside forms can be cleaned and oiled and the roof reinforcement completed in 4 to 5 hr. Delays incident to moving forms thus are reduced to a minimum, leaving ample time to place concrete in the same day that the forms are moved.

Steel outside forms for the arch travel on I-beam trolleys suspended from timber struts. As built, the side forms had two rows of pick-up tackle to handle the units during moves. Experiments on the job soon showed a single line of pick-up turnbuckles, hooked to the forms near the center of balance, to be more effective in speeding and facilitating the work. The pick-up points are so located on the forms that the steel units, when raised, swing a few inches clear of the concrete above the construction joint but do not come in contact with the trench sheeting at any point during a move.

Transverse bars for the arch are shaped by a power bender on the job. While the forms remain standing on one arch section, steel setters work ahead of the arch erecting and tying reinforcing bars. During erection the bars rest on portable wooden horses; after being tied they form a self-supporting structure, usually anchored temporarily to overhead struts as an additional precaution against damage while the reinforcing steel is being used as a working scaffold by the form crew.

Outside arch forms are pulled forward first to permit cleaning and oiling by men working through the reinforcing steel with long-handled brushes. These forms then are returned to position over the concreted section while the interior forms are moved forward, cleaned and oiled. Finally, the outside forms are brought up and blocked in place for concreting.

With arch reinforcement in place, the operations of stripping, moving, cleaning, oiling and setting steel forms for an arch pour can be completed in 2 to 3 hr. When not working on arch reinforcement, the steel crew keeps busy at setting bars for the invert or for the lower barrel. Bar bending always is available as a final means of keeping the men occupied.

Four-Barrel Sewer — To pass under Grand Central Parkway Extension on low ground at the outfall end of the sewer, the structure keeps down by means of a transition chamber to a four-barrel sewer on one level measuring 48½ ft. across. Steel H-columns on this part of the job were braced across a cut 54 ft. wide and 16 to 20 ft. deep by timber trusses with 12 x 12-in. upper and lower chords set 6 ft. apart, c. to. c., vertically and 8 ft. apart horizontally.

Administration — The storm trunk sewer was designed and is being constructed by the Bureau of Sewers of the Borough of Queens as part of the Borough's program to develop the area in the vicinity of the World's Fair site. Maj. Oscar Erlandsen is chief engineer of the Borough of Queens, and J. Franklin Perrine is chief engineer of the Bureau of Sewers. Construction of this and other sewers in the World's Fair area is directed for the Bureau by William Bishop, section engineer.

Value of the sewer contract is about $1,110,000. For Tully & Di Napoli, Inc., contractor, Howard B. Gates is chief engineer, and Frank P. King is superintendent.

Steel Corporation Builds MODERN PLANT

IN THEIR PROGRAM of expansion the Jones & Laughlin Steel Corporation has entered into the wire rope market, with a new modern plant and with every machine a precision machine, said to be the newest engineering marvels of today and tomorrow.

This new plant will be known as the Gilmore Wire Rope Division of the Jones and Laughlin Steel Corporation. Robert Gilmore, a leader in the wire rope industry, who is general manager of this division, together with his engineers have recognized the need for entirely new precision machines to meet present-day demands. Mr. Gilmore has devoted his entire business life to the development and manufacture of wire rope.

This new modern plant is indicative of an expansion and development program carried on by "J & L" under the direction of H. E. Lewis, its president.

LINCOLN TUNNEL APPROACHES

(Continued from page 43)

parking space. Two of the five girders, weighing 100 tons each, are 141 ft. long, c. to c. of bearings, 14 ft. deep at the ends and 10 ft. deep at the center of the span. The other three girders have lengths and weights, respectively, of: (1) 130 ft. 8 in., 103 tons; (2) 125 ft. 8½ in., 60 tons; (3) 119 ft. 9¾ in., 75 tons. Depths of these girders are 14 ft. at the ends and 10 ft. at the centers, except the third (75-ton) piece, in which the end depth is reduced to 13 ft. 6¾ in.

In hauling these five girders on Hudson County Boulevard East, the trucking contractor had to pull them up a 4 per cent grade and take them under an overhead bridge, located at a dip in the roadway, with only 18-ft. vertical clearance. Mounted in vertical position on the trailers, the deep girders barely cleared this bridge.

Park Ave. Crossing—For a crossing over Park Ave., just west of the Boulevard bridge, the truckers hauled lighter girders, of almost equal depth and length, in vertical position on trailers. Of seven girders required for the Park Ave. structure, five are arched-flange, 103 to 120 ft. long, 13½ ft. deep, back to back of flange angles at the ends, weighing 58 tons each, and two are parallel-flange girders, 9 ft. back to back of angles, 110½ and 112½ ft. long, weighing 45 tons each. These girders had the longer haul, 1 mi. from the railroad, but they did not have to pass under any overhead structures.

Hauling Equipment—Gooseneck trailers carrying the forward ends of the girders were equipped with eight solid-rubber-tired wheels mounted on two rocker axles to maintain contact with uneven traction surface. The two axles were set in line.

To carry the rear end, the hauling contractor used sixteen-wheel solid-rubber-tired trailers of patented construction designed with rocker axles capable of rocking in two directions, assuring ground contact and load-carrying capacity for all wheels. The girders rested on swinging bolsters, supported by angle brackets and turnbuckle ties.

Erection—For the heavy girders in the Boulevard bridge, the erectors used two 50-ton Speedcranes and bolted hitch connections. After the truckers had spotted a girder as close as possible to the bridge piers, the two cranes picked it up at as short working radius as possible and moved it toward the bearing points, traveling on plank runways laid at right angles to the girder. When they had approached as close as possible to the bearing points, the two cranes raised the girder and moved it the additional distance required for lowering on the bridge shoes. The boulevard was closed to traffic during the erection of each girder.

Lighter girders in the Park Ave. structure were erected by a 50-ton and a 25-ton Speedcrane, the hitches being spaced to have the cranes take loads less than their individual capacities. Additional girders of smaller dimensions, erected in a third structure crossing Pleasant Ave., presented no problem in handling or erection.

Supervision—Steelwork was furnished and erected by the American Bridge Co. For Bigley Bros., Inc., hauling contractor, Bernard F. Bigley, vice-president, was in charge of operations. William J. Bigley is president of the firm.

For the Port of New York Authority, J. C. Evans is chief engineer, Charles S. Gleim is engineer of construction, and A. B. Lincoln is resident engineer on the work here described.

Richmond Brick Paving *(Continued from page 39)*

COAT OF WHITEWASH carefully applied to brick surface with hand brushes facilitates filling of joints and permits easy stripping, in background, of excess asphalt from top of pavement.

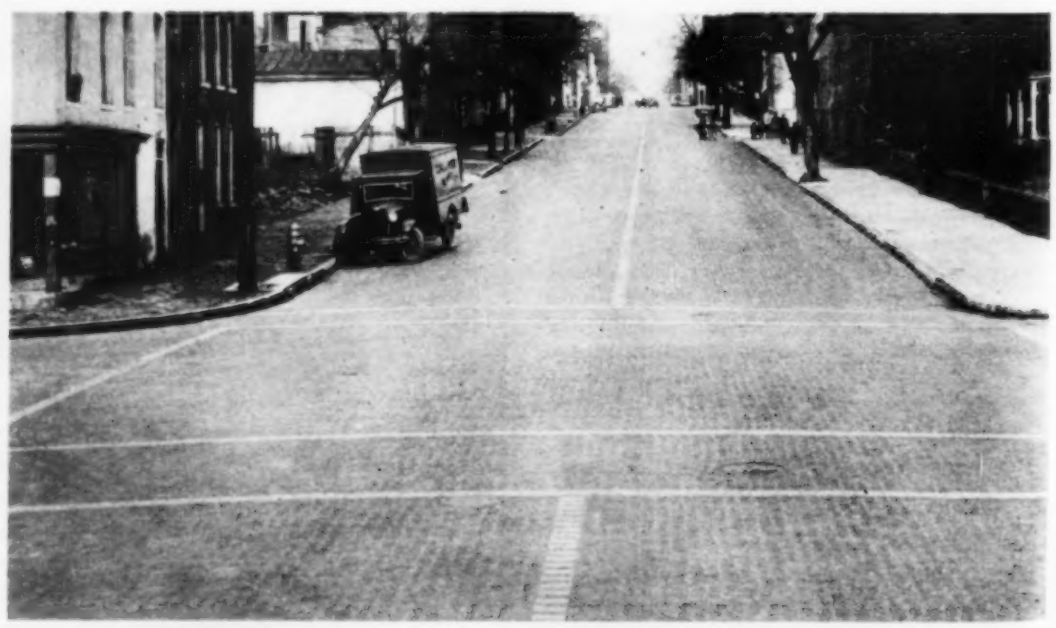
are made to coincide at the center construction joint. Weakened planes were sealed with asphalt just before the construction of the cushion.

Traffic Markers — Center-line markers for vehicular traffic and pedestrian lanes at intersections, using a contrasting color of brick, are safety features which Richmond is using in its brick construction. With the use of center-line traffic markers the order of bricklaying is reversed, as the laying has to start at the center traffic line, working toward the curbs. To make sure that the traffic line would be straight, it was laid out with a transit. As the paving brick generally is of a red color, a light buff-colored brick with a smooth surface was used as the marker. To keep the traffic line straight and make certain that the right color of brick was put in the alternate courses, one man was used to start the bricklaying at the center line, and it was his duty to lay the center line and also three or four bricks on each side of the center line, working a few courses ahead of the bricklaying.

After the bricks were laid, culled and the courses straightened the contractor was required to have one man ram the pavement along the gutter with a one-man rammer on a 2-in. block.

Rolling Problem — All specifications generally call for bricks to be laid at right angles to the center line of the street, the rows straightened by one method or another, and then rolled with a 5-ton roller directly on the brick surface. The first two operations are easily carried out successfully, but the problem of rolling directly on the brick without breaking many of them, as well as displacing the courses, has in the past given some concern. With a view to eliminating these two undesirable features in brick construction, the Bureau experimented first on a small project by discarding rolling entirely and ramming the brick with a two-man rammer on a steel plate drawn transversely across the pavement. This method was quickly eliminated as unsatisfactory.

Rolling on Boards — Richmond experimented further by rolling on 1-in. boards, dressed both sides, and of uniform width, and this method seems to have solved the problem. Rolling on



CENTER-LINE STRIPES and pedestrian lanes permanently marked by light-colored bricks provide built-in safety features of completed Richmond pavement.

boards now is included in the city's specifications. The contractor is required to have enough boards for longitudinal rolling of 24 ft. Previous to this experiment the maximum weight of a tandem roller used for the rolling of brick pavement had been limited to 5 tons; in contrast specifications now call for a tandem roller of not less than 5 tons nor more than 10 tons. The work actually was done with an eight-ton roller and the upper limit of weight no doubt is preferable.

Rolling on boards results in few broken bricks; it has eliminated entirely the displacement of the courses, and a satisfactory embedment of the brick in the cushion is obtained. It is necessary, of course, to have all the boards of uniform thickness to prevent uneven compression of the brick. Uniform length is not essential, but care should be taken to see that when the boards are moved from the rolled surface and laid on the unrolled surface they are in close contact with one another.

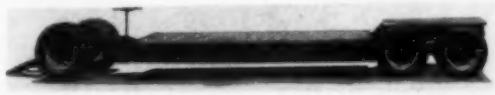
Rolling on boards, instead of being an added expense to the contractor, in the long run probably is a saving, as there are few broken bricks to be replaced with whole bricks, and the saving in labor and bricks no doubt offsets the labor used in moving the boards and the purchase price of the boards. At the beginning of our experiment three laborers were used to move the boards, but this number soon was found unnecessary and finally was reduced to one. The dimensions of the boards were 8 ft. by 10 in., dressed to 13/16 in. in thickness.

Variations exceeding ¼ in. under a 16-ft. straight-edge are required to be corrected by removing the bricks, reshaping the bedding, relaying and rerolling.

Filling Joints — A thick whitewash is used as a separating agency to remove excess asphalt filler from the surface. The whitewash is applied with a 3-in.-wide paint brush, and each brick is given two or three strokes of the brush. Operations are closely supervised to prevent any of the whitewash from getting into the joints.

When the asphalt in the joints has cooled sufficiently, it is cut from the surface of the pavement with spades or other cutting tools, leaving the joints filled and the surface of each brick free from asphalt. Any joints found not filled to the surface of the brick, after the asphalt has been removed, are poured with a hand pot; and any surplus asphalt left on the surface of the pavement is removed.

CORRECTION — The August issue of CONSTRUCTION Methods and Equipment contained on page 68 a description of the new C. R. Jahn Co. lightweight utility trailer. The illustration which accompanied this item showed a heavy-duty trailer instead of the



machine described. The accompanying photograph shows the new All-Purpose lightweight trailer which is said to handle efficiently loads up to 48,000 lb. Easier and faster loading has been made possible by unique construction at front end of trailer frame which serves both as a connection and turntable for the front axle and permits entire front axle assembly to be removed. Loading also has been made easier by a heavy jack screw built into coupling assembly which raises or lowers trailer frame as needed. Two rear axle arrangements, either tandem or dual oscillating. Heavy-duty full balloon pneumatic tires on all wheels. Standard equipment includes adequate loading ramps, lash rings riveted to side frame, heavy drawbar safety chains, reflectors and stake and flag pockets. — **C. R. Jahn Co., 228 North La Salle St., Chicago, Ill.**

Chickamauga Dam

(Continued from page 45)

cial holder while lifting to a new position.

Form panels were designed in the field office at Chickamauga Dam. The studding is 3 x 10 in., and studs are arranged in pairs with two studs at 7-in. centers, the pairs being spaced 2 ft., c. to c. This arrangement permits rigid and tight bolting of the lower bolt.

Pipe Strut — Most radical of the innovations is the method of holding the upper end of the form. The usual form rod and brace are combined in a single pipe strut. Struts are spaced 4 ft., c. to c. In each end of the pipe are welded five-turn Tycoils. As 1-in.-diameter bolts were to be used, the Tycoils were too small to fit the 2-in. pipe strut. It was necessary to weld the coils into short pieces of 1½-in. pipe, which in turn were welded into both ends of the 2-in. pipe struts.

Anchors cast in the concrete to hold the lower ends of the struts have lag screw threads on their outer ends. The design was first tested to determine its holding power in 2- and 4-day concrete.

Top Bolt Holder — At the top of the form, steel lugs are welded in pairs to the back of the channel at 4-ft. intervals, with single lugs at the ends of the panels. Extra sets of lugs are welded near the end of panels for additional struts in the corners of forms. All lugs project over the inside of the form at an upward angle of 45 deg. A bolt, 1 in. by 16 in., having lag screw threads on one end and machine screw threads on the other end carrying two hex nuts, one welded and the other loose, sets between the lugs and screws into the strut. A keeper bolt which prevents the bolt from slipping out of the lugs is never removed except to replace worn-out form rod bolts.

As shown by one of the photographs, the concrete of any lift does not cover these form bolts; hence they are readily unscrewed from the pipe strut and remain loosely in place on the form as it is raised to the next lift. The exposed end of the 2-in. pipe with its coil thread is cut off and welded on to a new strut, thus reducing the quantity of new coils required.

There were no failures of this type of combined form rod and strut where ordinary care was taken in making the welds. One strut rod gave way, but in this case the weld on the end of the 2-in. pipe was made on the end of a rusty and badly corroded thread. The threads broke, and the form deflected out of line. The pipe used was mostly second-hand, and some was badly corroded. This particular piece escaped the inspectors during a rush period.

Attached Scaffolds — Safety scaffolds are built on to the forms, as shown in a second, smaller drawing accompanying these notes. The scaffolds provide working platforms for men while concreting and also speed up the stripping and erection of forms. A photograph shows safety scaffolds on forms in use.

Form Stripping — In removing forms, all of the panels on one face are bolted or nailed together. The aluminum A-frames (up to six in number, depending on the total length of the combined panels) are set up, as illustrated by an accompanying photograph. Lift chains of 3-ton ratchet hoists are attached to the lifting eyes on the forms, and hoist lines are pulled tight. A gang of men removes the bolts on the side of the form, bottom and top, using ratchet wrenches. Finally, the top form bolts are removed, and the form is readily pried loose from the face.

With two men on each hoist, the form is lifted When the panels are about in final position, men on the lower walkway of the scaffold screw in the bottom bolts. Men in the forms and on top screw on the pipe struts. The form is quickly lined up, and shortly the A-frames are removed.

Lifting time required to move a form through a vertical height of 10 ft., ready for bolting into its new position, was 10 min. All forms were set in place for the first lift by gantry cranes and were removed by them when the block was completed.

Lifting eye-bolts are spaced at various distances to fit the different lengths of forms used. On a 24-ft. form they are installed 12 ft. apart, at the quarter points. On short forms, 8 ft. long, only one eye-bolt is used.

Anchors for the lower ends of the struts are accurately located in the concrete by means of a light templet, shown in two photographs, that automatically takes care of variations in elevation of the concrete. This device standardizes the length of form struts and eliminates much lost time. A special driving cap is used to prevent damage to the anchor threads.

Curing Water — To wet the concrete from water pipe attached to the bottom of the forms, atomizing spray nozzles were used at first but were too readily clogged. Water was pumped directly from the river into the plant system. Up until the time of the first freshet in the river they worked very well. On a clear water supply their use is recommended because they are economical of water. It finally was necessary to bore small holes of ⅛-in. diameter on 12-in. centers. The holes plugged frequently but gave better general service than the nozzles.

Short pieces of hose were used where the individual panels joined. By this method the sprays were quickly put in operation after a form was raised. Water pipes, as well as air pipes, were brought up in each lift at a convenient location to make connections readily available at the top of each block. Garden sprinklers were used to cover the top of the fresh concrete.

Administration — The Tennessee Valley Authority organization is headed by a Board of Directors composed of H. A. Morgan, chairman, and David E. Lilienthal. Theodore B. Parker, chief engineer, and Carl A. Bock, chief consulting engineer, are largely responsible for the general direction of engineering and construction operators. The organization at Chickamauga Dam consists of Lee G. Warren, project engineer; James B. Hays, construction engineer; Fred C. Schlemmer, construction superintendent. Extensive studies on form details have been made under the direction of W. J. Bailey, head of the Drafting Department at Chickamauga Dam.

OIL RECLAIMER

Cuts Lubrication Costs

REMARKABLE SAVINGS in lubrication costs plus additional economies in engine maintenance and fuel expense are claimed for the new oil reclaimer manufactured by Bucyrus-Erie Co., of South Milwaukee, Wis. Recovery of up to 90 per cent of average crank-case oil has been accomplished by the use of this machine, and the quality of oil has been improved because its weak and unstable parts have been broken down by heat and friction in the engine and the wastes, such as carbon, waxes, tars, resins and acids, plus accumulated grit and dirt, have been completely removed by the washing and filtering process.

OSHKOSH 4-Wheel Drive Tractor WITH SOUTHWEST Scraper –

A 4-WHEEL DRIVE EARTH MOVER

- ***Pioneer of New Lower Cost Hauling Methods***

By combining the fast moving, low operating, low upkeep Oshkosh 4-Wheel Drive hauling unit with the Southwest specially developed high-speed scraper, dirt moving costs of operating this new earth mover are virtually cut in two.

The special 16-yard, high-speed SOUTHWEST Scraper, designed especially for the "OSHKOSH" 4-Wheel Drive, 4-Wheel Steer Tractor, has been engineered to meet the new requirements: QUICK LOADING —FAST UNLOADING — RAPID TRAVEL —AIR HYDRAULIC BRAKES on all wheels. Special low gravity Carry Frame makes possible unusual high speed. Results: LOWER COST DIRT.

Exclusive Selling Agents

OSHKOSH 4-WHEEL DRIVE SALES AGENCY

OSHKOSH, WISCONSIN, U. S. A.

CONSTRUCTION EQUIPMENT NEWS

Review of Construction Machinery and Materials for OCTOBER, 1938

NEW SPRING LIFT for all four models of Gar Wood hydraulic scrapers prevents tractor from stalling and losing time during digging operation. When cutting edge of bowl lip enters ground, large loading springs are compressed. When load increases and tractor is laboring, operator merely touches blade control lever and cutting edge snaps out of ground. Springs, without consuming any tractor power, instantly reduce cutting depth and relieve drag on tractor thus leaving all power for pulling scraper and preventing stalling. — **Gar Wood Industries, Inc., Road Machinery Division, Detroit, Mich.**

WELDING ELECTRODES designed for welding on parts subject to heavy impact, such as manganese castings, railroad frogs and crossings and dipper teeth. Made of composition called "Harmang" whose base metal is nickel manganese steel, ranging from 11 to 14 per cent nickel manganese, 3½ to 4½ per cent nickel. Carbon content is in excess of 1 per cent. Slag coating which stabilizes arc and protects metal against loss of carbon and manganese is kept to a minimum so as not to interfere with rapid cooling required to form an austentitic deposit. Operates with work negative and electrode positive and is built in sizes from ⅛- to ¼-in. diameter for use with currents ranging from 90 to 140 amp. — **Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.**

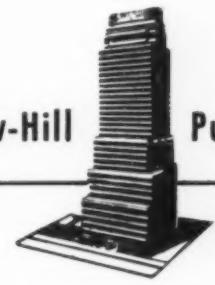
STEEL TUNNEL LINER PLATES available in every design of tunnel contour for lining tunnels of different sizes and varying soil conditions have following advantages: (1) Flanges between ends and sides make them stiffer across diagonal corners providing added safety and speed during construction; (2) small triangular openings between assembled plates make possible checking of ground conditions before concreting; (3) grout openings automatically provided in all plates for grouting after concrete lining is poured; (4) openings at corners of plates enable workers to reach back of plates with bars and bring them into line for bolting, in case shifting has occurred. When loose sand or gravel is being mined special patented corner is provided which completely seals all openings and acts to speed assembly of plates. — **Youngstown Steel Car Corp., Niles, Ohio.**

PUBLIC RELATIONS
for
INDUSTRY

☆

WITH SPECIAL REFERENCE TO
THE CONSTRUCTION INDUSTRY

A presentation of the imperative need of mutual understanding in the conduct of our daily work.



Presented by CONSTRUCTION METHODS and EQUIPMENT, a McGraw-Hill Publication

AN EDITORIAL SERVICE TO MEET *Industry's* MAJOR PROBLEM

To the readers of Construction Methods and Equipment:

● There is no doubt that today the American people are taking a keener, more critical interest in the conduct of business than ever before. And when I say critical, I mean exactly that. During recent years most of them have suffered loss, either of jobs or of savings, and under such circumstances men are prone to accept without serious question any scapegoat that appears plausible. In the confusion of fears and resentments, they seem to have concluded that short sighted and selfish business management is chiefly responsible for their misfortune.

However mistaken and unfair such conclusions may be, management cannot ignore them. It must recognize that in the long run, the opinions of men are the result of experience, of what happens to them each day, much more than of what they are told.

Progressive management has already faced that fact; has already begun to think and work beyond the technicalities of production and distribution that once absorbed most of its energies. It sees more clearly and deals more proficiently with its human responsibilities. It is learning to reconcile the economic success of the industrial unit with the social welfare of worker and community.

Presently, every business—the small retailer as well as the large manufacturer—must learn how to interpret more convincingly to its own public the social as well as the economic benefits of its policies and accomplishments. Only as each business satisfies the newly aroused and critical interest of people in its affairs will it be able to disarm those who trade on the human tendency to blame our troubles on someone else. Yes, if business as a whole is to win a favorable public opinion, each and every business must act to improve its own public relations.

The readers of this journal, and of other business publications, compose, we believe, a group that can achieve for American business a sound and lasting solution of this vital problem. They alone are in position to shape the working conditions of 21 million employees. They alone can mould the attitude of those other millions who compose the various "publics" to which all business must be responsible.

Heretofore, the function of business papers has been to exchange successful experience; to dig up and disseminate practical facts for the use of their readers, serving primarily the technical and merchandising needs of business. But this matter of human relations has now become of equal importance, for good industrial and public relations, it has been found, reduces corporate losses, removes fear and suspicion, promotes operating efficiencies in both production and sales. A better knowledge of public relations technique is, therefore, quite properly essential for men in, or moving into, positions of greater executive responsibility.

So, beginning with this insert, each McGraw-Hill publication sets out to strengthen its editorial service in the important domain of Public Relations. I hope that the million readers of McGraw-Hill's business papers will get much real and practical help toward building better relationships between their own businesses and their employees, their customers, and the communities in which they must carry on.

James H. McGraw Jr.

President, McGraw-Hill Publishing Co., Inc.

Why A PUBLIC RELATIONS PROGRAM

● In less than two generations the United States has changed from an agricultural to an industrial nation. Living standards and efficiencies at once the despair and envy of other countries have been created. Foreign delegations still flock to our shores to study our methods so that they may use them as patterns for their own organizations. Yet here at home today these methods and the systems responsible for them are under increasing attack.

Since every person employed in productive enterprise is a part of American industry, these attacks imperil the livelihood of nearly forty million workers and their dependents. The newest addition to the payroll has as much — if not more — at stake as the veteran business executive. That also is true of particular industries which at present may not be under direct fire. All industry is so interrelated and interdependent that even the seemingly immune enterprise must suffer when the legitimate activities and the buying power of their customers, or the customers of their customers, are curtailed.

IRONICALLY ENOUGH, public acquiescence in many of the current attacks is an indirect recognition of the satisfactory manner in which our industrial system normally functions. Reasonable opportunities for the employment of those ambitious to put their mental or physical talents to work, and continually rising standards of living have come to be widely accepted as a matter of course. Any unfavorable change in these conditions leaves the general public surprised, confused and resentful. Such reactions as these make it easy for pressure groups to unloose destructive propaganda which further heightens resentments and breeds new misconceptions.

These misconceptions take many forms shaped by the experience, the inexperience, or the special interests of the critics. To one it appears that business can't manage itself and must be owned and managed by the Government. Another believes that employees are underpaid or that stockholders and executives are overpaid. To others corporate surpluses are too high. Many have convinced themselves that power and machines have reduced employment opportunities; and that industry can raise wages and reduce prices while costs go up.

Several misconceptions are based on faulty generalizations. Because a few companies have been remarkably successful, it is argued that all could make money. Because some corporations have been ruthless, all corporations, it is contended, will stoop to unethical conduct to gain their ends. This is like saying: John Smith killed Bill Brown; John Smith is auburn-thatched; all redheads, therefore, are murderers. Unfortunately, those who would indict all business for the crimes of a few are more subtle in their approach and so create an impression not in accord with the facts.

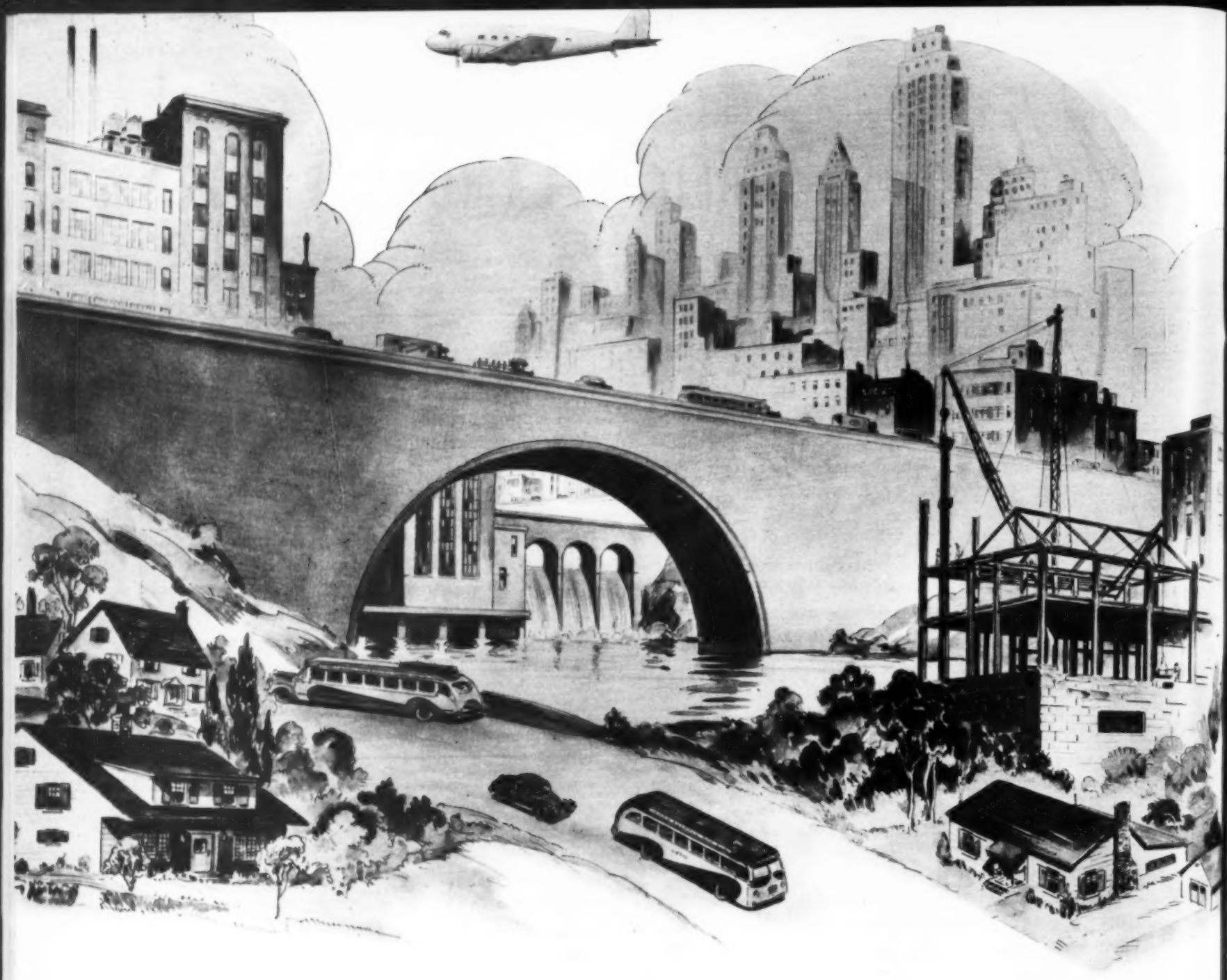
To put it bluntly, American industry, once so highly praised for its contributions to the national well-being is now on the spot. Prevailing misconceptions of how business operates and what it does have made a field day for those who propose to hamstring or destroy private initiative and individual opportunity. These proposals run a broad gamut: They include public ownership, increasing and rigid federal control at the expense of local autonomy, ill-conceived legislation on hours and wages, labor dictatorships, and confiscatory taxes on thrift and employment security.

While the man in the street may be criticized for his willingness to swallow these nostrums, he is not wholly to blame. Industry, too, has been at fault, in assuming either that he was fully informed on those phases of its operations which are properly a matter of public interest, or that a healthy curiosity should be discouraged. Misconceptions multiply where the facts are hidden.

The tragedy of the situation lies in the fact that it might easily have been avoided. In the simple days of local and localized industry, everybody connected with a particular enterprise knew everybody else connected with it, and the details of its operations were an open book. The boss and the employees were neighbors; the customers, for the most part, fellow townsmen. Outside purchases were limited largely to those products which the local community neither manufactured nor raised. Competition in the modern sense was practically nonexistent.

As industry developed and enlarged its field of operations, much of this early intimate personal touch was lost. The small enterprise grew bigger. In some cases combinations took in the local business and financial control passed out of the community. The local industry which still retained its identity was busy meeting increased competition and seeking to expand its distribution. Little attention was paid to changing conditions that were fostering misconceptions about the personal relations of the business. Bit by bit the close acquaintance and familiarity of the early days disappeared.

Common understanding of these things also was impeded by the greater variety of occupations as industry expanded. Each man's job became so highly specialized that the old feeling of common partnership in a joint undertaking frequently was buried in an exaggerated feeling of the relative importance of his own work. This made it easy for each occupational group to get the idea



that its contribution to the undertaking alone was essential and that many of the other groups were parasitic or, at best, unimportant.

Such mistaken beliefs are the exclusive property of no particular group. "Goods are valueless until sold," chants the sales staff; "without us the wheels of industry would cease to turn." The wheels would turn much faster, growls the production department, "if we didn't have so many lame-brains drawing fat salaries as salesmen." Under the cold glance of both groups, the clerical force heatedly inquires: "How long do you think this business would last if we didn't keep the cost records, send out bills and collect the money for pay checks?" Some executives and engineers, too, have been known to forget that their plans cannot be carried out without the cooperation of other groups.

Possibly the greatest single cause of misunderstanding and friction has been fuzzy thinking on social responsibilities. Many of the responsibilities which rested on the individual or the state in our fathers' and grandfathers' days have been shifted to the shoulders of industry. New ones constantly are added or proposed — often before industry has had time to adjust itself to those which have gone before. Some of these responsibilities affect employee relations; others involve customer relations. The worker, for example, no longer is completely defenseless against the occupational hazards of his employment. "Let the buyer beware" no longer is considered smart merchandising. Many of the changes now embodied in the laws were anticipated by industry itself. Opposition — valid or otherwise — to social legislation, however, has been used to damn business in the public eye.

Fortunately, the barriers to good will and common understanding can be broken down. The process is a simple one. It consists chiefly in maintaining good policies in human relationships and in keeping all interested people — employees, stockholders and their neighbors, customers and the general public — informed. It means telling them in plain terms what revenue is received and where it comes from, what revenue is paid out and who gets it, how an industry serves the individual, the community and other industries. Finally, it includes the acceptance of the social responsibilities which the advance of civilization imposes upon business.

Add all these things together and you have public relations.

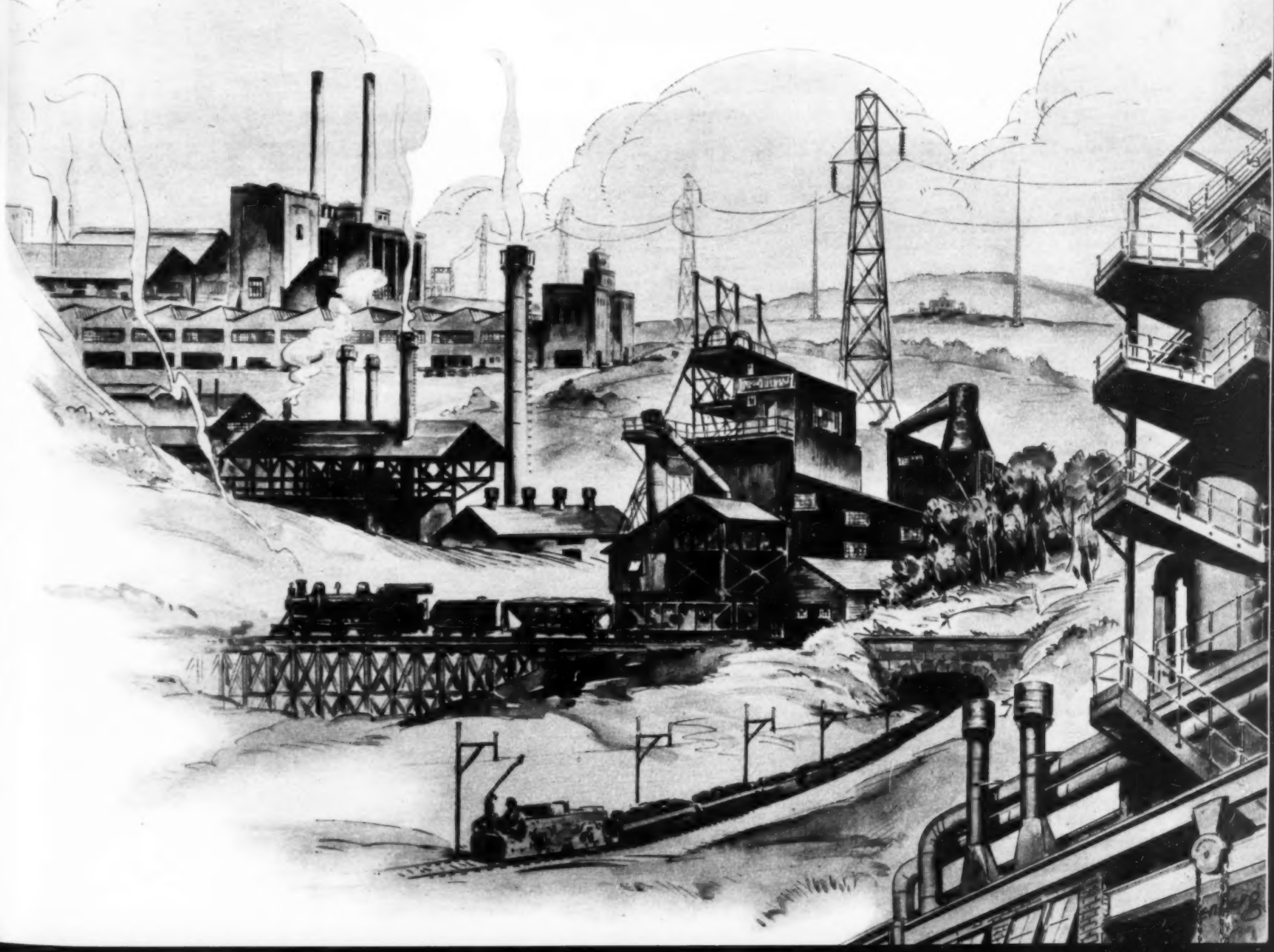
Most employers are willing to accept their social responsibilties, but they are inexpert in making that acceptance articulate. Too many employers have failed to make clear their policies, their practices and their purposes as they relate to fair dealing with employees. investors and the general public. Their intentions have been good, but they have cloaked them with a veil of secrecy and made a mystery out of simplicity. As a result the uninformed have been given a royal opportunity to exercise their imagination. And they have done it!

PUBLIC RELATIONS is a comparatively new activity for most business enterprises and involves a technique which too many have not yet learned. Obviously, the first place for each company to start is within its own organization. This is the "inside job" that builds a company's good name among its own family and lays the firm foundation for building public confidence and favor. As one exponent of the art phrases it: "Industry's public relations cannot be one thing and its private actions and policies something else. The two must be in complete accord."

The inside job should present no real difficulties to fair-minded employers. Most workers have a normal predisposition to view in a favorable light the organization in which they earn their livelihood. Most companies endeavor to conduct their operations so as to justify that favorable attitude. But too few of them are adept at dramatizing the facts that furnish a substantial basis for maintaining employee good will. So, where misunderstanding and suspicion born of ignorance exist, time may be required to break down the barriers that have grown up.

The task of telling this inside job to the outside world, however, will not be easy, for two reasons. First, it has been so long neglected that the backlog of misunderstanding is large. Second, public relations involves attitudes as well as actions, a viewpoint as well as an organization. Public relations is not a commodity that can be purchased like a car of coal or a bolt of silk; neither can it be sold by "canned" material. Each program to establish sound public relations must be individualized and indisputably stamped with the personality of the company promoting it. *And the deed must always back the word!*

But the task is worth the effort. For, with the inside job right, a properly conceived and intelligently executed public relations program offers business the means of successfully counteracting unjust public suspicion, unfair political attack and unwarranted outside dictation. The need is urgent.



The Men Employed on Construction

CONSULTING ENGINEERS-ARCHITECTS

(Who Plan and Supervise)

ENGINEERS & CONSTRUCTORS
(Who Plan, Supervise, Build)

STAFF ENGINEERS
Private Organizations (Who plan, supervise, or build)

Industrial
Company
Public Utilities
Railroads

SERVICED & SUPPLIED
by
Manufacturers
Producers
Distributors
of
Materials
Construction Equipment
Installed Machinery
Fabricated Products
Tools and Supplies

STAFF ENGINEERS
Private Organizations (Who plan, supervise, or build)

Federal
State
County
Regional or District
Municipal

CONTRACTORS & CONSTRUCTION COMPANIES

(Who Build)

With these SKILLED, SEMI-SKILLED, UNSKILLED WORKERS

Acetylene burners
Aggregate-bin chargers
Aggregate-plant-control-board operators
Aggregate-screening-plant operators
Aggregate-stoker operators
Air-compressor operators
Air-hammer operators
Asbestos workers
Asphalt workers

Bargemen
Blacksmiths
Boilermakers
Bootmen
Brakemen
Bricklayers

Carpenters
Cement-screening-plant operators
Cement finishers
Cement finishers (sidewalk, curbs, and gutters)
Churn drillers
Compressed air workers (sandhogs)
Concrete-batching and mixing-plant operators
Concrete chippers
Concrete dispatchers
Concrete-mixer operators
Concrete-pump operators
Concrete-vibrator operators
Concrete-form strippers
Concrete-form-anchor setters
Conveyor tenders
Core drillers
Crane operators
Crusher operators

Deckhands
Divers
Diver's tenders
Dinkey operators
Derrick operators –
Dragline operators
Dredge captains
Drill sharpeners
Dumpmen

Electricians
Elevator constructors

Firemen, locomotive
Firemen, shovel, crane, stationary

Glaziers
Grader operators
Grout-machine operators
Gunite workers

Handymen (mechanical)
Hod carriers (brick)
Hoistmen
Hoist operators
Hook tenders (cranes, derricks, concrete placement)

Jackbit grinders

Laborers, underground
Laborers, concrete construction
Laborers
Lathers (wood or metal)
Levermen
Linemen
Locomotive engineers

Machinists
Masons, stone
Mechanics
Miners, machineman
Miners, chuck tender
Mosaic & Terazzo workers
Motor patrols
Mucking-machine operators

Nippers

Oilers, shovel, crane, dragline, and dredge
Oilers, other equipment
Operators, power shovel, excavating equipment
Ornamental-iron workers

Painters
Pile-driver engineers
Pile-drivermen
Pipe layers — does not include culverts
Pipemen
Plasterers
Plumbers
Powdermen
Pumpcrete operators
Pumpmen, centrifugal

Reinforcing-steel workers
Riggers — structural-iron work
Riggers — pile-driving work
Riveters
Roofers

Sanders, portable on concrete forms
Sand-classifier operators
Sand drying and screening workers
Sheet-metal workers
Signalmen
Slopers
Steamfitters
Structural-steel workers

Tile setters
Timbermen
Trackmen
Tractor drivers
Dump-truck drivers
Truck drivers, flat bed
Transit-mix drivers

Wagon-drill operators
Watchmen
Water-clarifier operators
Welders (arc or acetylene)

A PUBLIC RELATIONS PROGRAM FOR THE *Construction* INDUSTRY

● Public relations problems of all industry have been reviewed in the preceding pages in general terms. Turning now to the construction industry, what are its public relations problems and what program for improving them can it adopt?

The public relations problems of the construction industry are varied, due to the fact that the industry's contacts with the public begin with the engineers and architects who design private undertakings, or with public-works officials who plan and direct public construction, and continue through the operations of the contracting firms or public agencies that bring the plans to completion. In city, state and federal public works engineers have a continuing contact as operators of water supply systems, sewage disposal plants and power supplies, also as maintainers of highways, streets and other facilities.

But though diverse and arising from many causes, the public relations problems are no less real than those of a closely-knit industry. They are in fact more vital because of the common tendency to look on the construction of new works or betterments as luxuries rather than as essential elements of human progress.

LITTLE PUBLIC RECOGNITION

The construction industry's first and major public relations problem finds its origin in the fact that the public has no conception of the important part construction plays in the nation's economic system. It is one of the nation's largest employers and most effective balance wheels. Next to farming, construction is America's largest industry. More significant still is the fact that for every man directly employed on construction nearly three others are supplied with useful work "behind the lines"—in quarry, lumber yard, cement and steel mills, in equipment manufacture and materials fabrication plants, and on the highways and railroads. These men supply, process and handle the materials and equipment that go into a multitude of construction operations.

Cut off the job of a construction man and automatically three other men behind the lines lose their jobs. Keep construction running at an even pace and dangerous fluctuations in business are checked.

It is an obligation of the many elements of the construction industry to put these facts before the public—no one else will.

Further, if the flow of capital into construction that is needed to keep the nation's economic structure functioning smoothly and with reasonable stability is to continue, the public must be kept aware of the worthwhile nature of the ever-increasing number of services which now supply the construction industry with so large a part of its income. Better highways, streets, water-supply systems, sewage disposal plants, parks, playgrounds, public buildings, bridges, tunnels and flood-control projects, when well planned to meet growing needs, are not extravagances but are desirable means for increasing the nation's wealth and raising its standards of living.

Thus a second major public relations problem is that of offsetting the false arguments of those who would throttle investment of public funds in public service.

A third public relations problem is that of educating the public as to the vital importance and economic value of the system whereby engineers and architects plan and contractors build the multitude of buildings and structures that the nation requires. The public must be made to recognize that engineer's fees and contractors' profits are not luxuries that can be discarded but are compensation for skill which more than pays for itself in reduced cost. Similarly, the salaries of the engineers in public service who plan and direct public construction must be shown to be far offset by economies that such supervision brings as compared with haphazard and unplanned work. A long step toward better recognition of these services will have been made when the construction industry gives more thought to courteous, enlightened treatment of the public in its contact with construction operations.

Finally, there are two internal matters that need to be corrected before the industry can make much headway in improving its relations with the public. First, the elements of the industry need to improve their relations with one another—engineers, architects, public-works officials, contractors and building-trades unions; and second, the industry must perfect its relations with its employees. From the man in the drafting room making preliminary plans to the man placing concrete in the finished structure, each must be made to feel that he is a recognized part of the construction industry. Satisfied men who are proud to be a part of the industry and are confident that the industry is concerned with improving their economic position and security will be the construction industry's best ambassadors in developing better public relations.

THE PUBLIC RELATIONS PROGRAM

Brought down to essentials, the public relations problem of the men who make up the construction industry—engineers and architects, public-works officials, manufacturers of construction equipment and materials, contractors, and the army of men they employ—is to sell the public, and keep it sold, on the importance of their industry to the wellbeing of the nation. This will call for the following action: (1) Aggressive development of contacts with the public through which to promote wider knowledge of the importance of industry; (2) Lessening the inconvenience to the public caused by construction; (3) A sincere effort to satisfy public curiosity concerning what any particular construction operation is; (4) Publicity through press and public bodies to stress the importance of a proposed project; (5) Courteous treatment of the public in its contacts with all public works; (6) Greater provision for safety of both employees and the public; (7) Improved relations between the elements of the construction industry; (8) Better employee relations and more security in employment.

THE *Construction* INDUSTRY

WHAT IT IS • • WHAT IT DOES

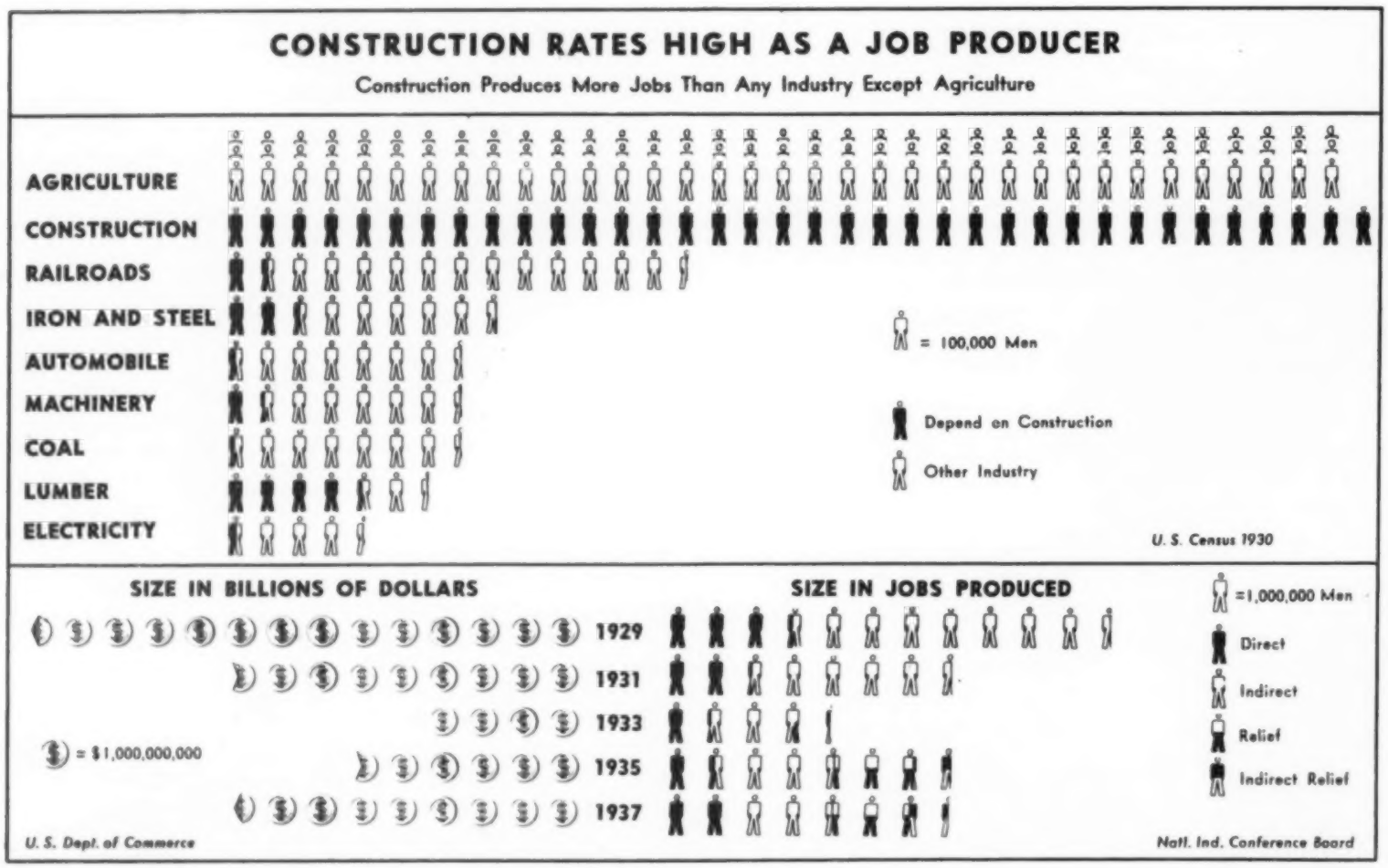
● Construction, in normal years, fills more pay envelopes with more dollars than does any other American industry, except agriculture. As a provider of jobs for both skilled and unskilled workers, construction supplies in abundant measure the very life-blood of our national well-being. Every tenth person gainfully employed in the United States depends upon construction for his livelihood, for construction is a large spender, carrying a wallet stuffed with $10,000,000,000 in January and emptied, by December, by payments for labor, materials and equipment. Yearly expenditures for construction amount to about one-eighth of our total national income.

JOBS FOR 10,500,000

Translated into terms of jobs, this huge outlay means employment, direct or indirect, of at least 10,500,000 workers. Of this number about 3,000,000 are directly employed at the sites of construction projects, while an additional army of 7,500,000 or more persons is carried on payrolls for services in mines, forests, mills, or factories where the materials and the machines of construction are produced or processed and whence they are transported by rail, road or waterway to points of use hundreds or thousands of miles distant from the original source of supply or manufacture. One indication of the far-reaching influence of this indirect, or off-the-job, employment by construction is furnished by the fact that in good times one out of every five freight cars operating on American railroads carries construction materials in raw or finished form.

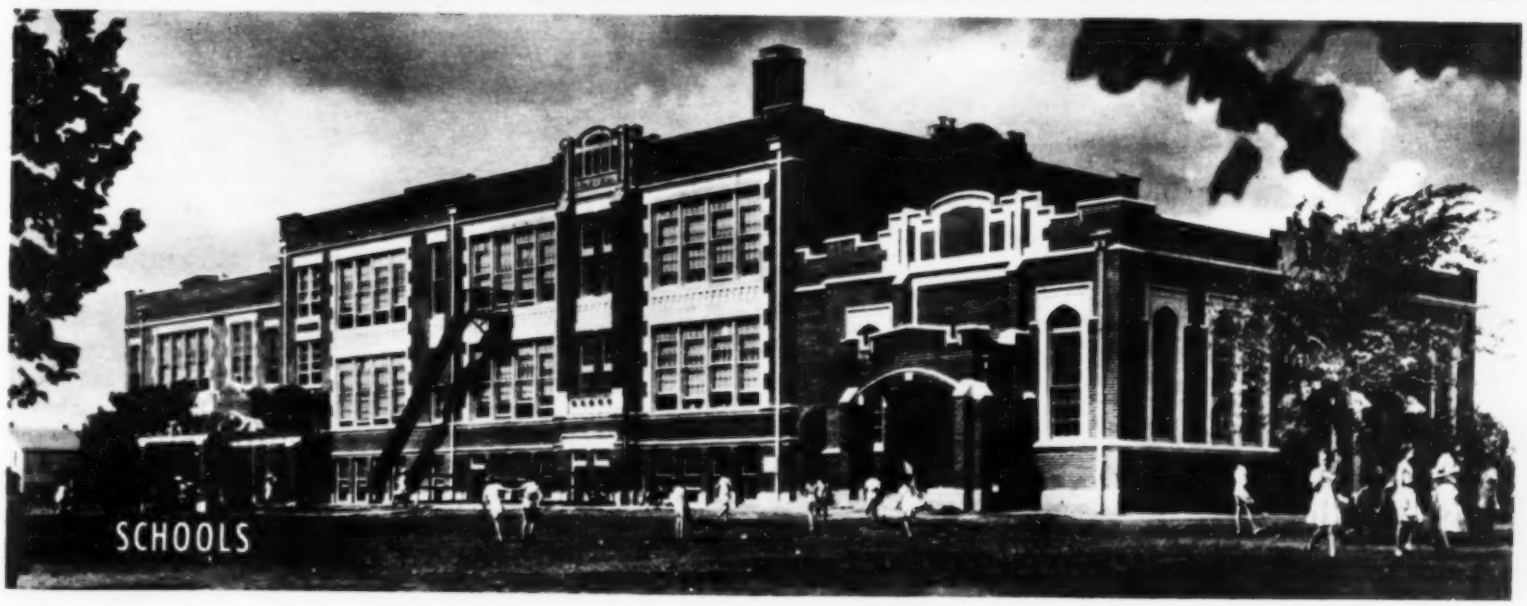
INDIRECT EMPLOYMENT

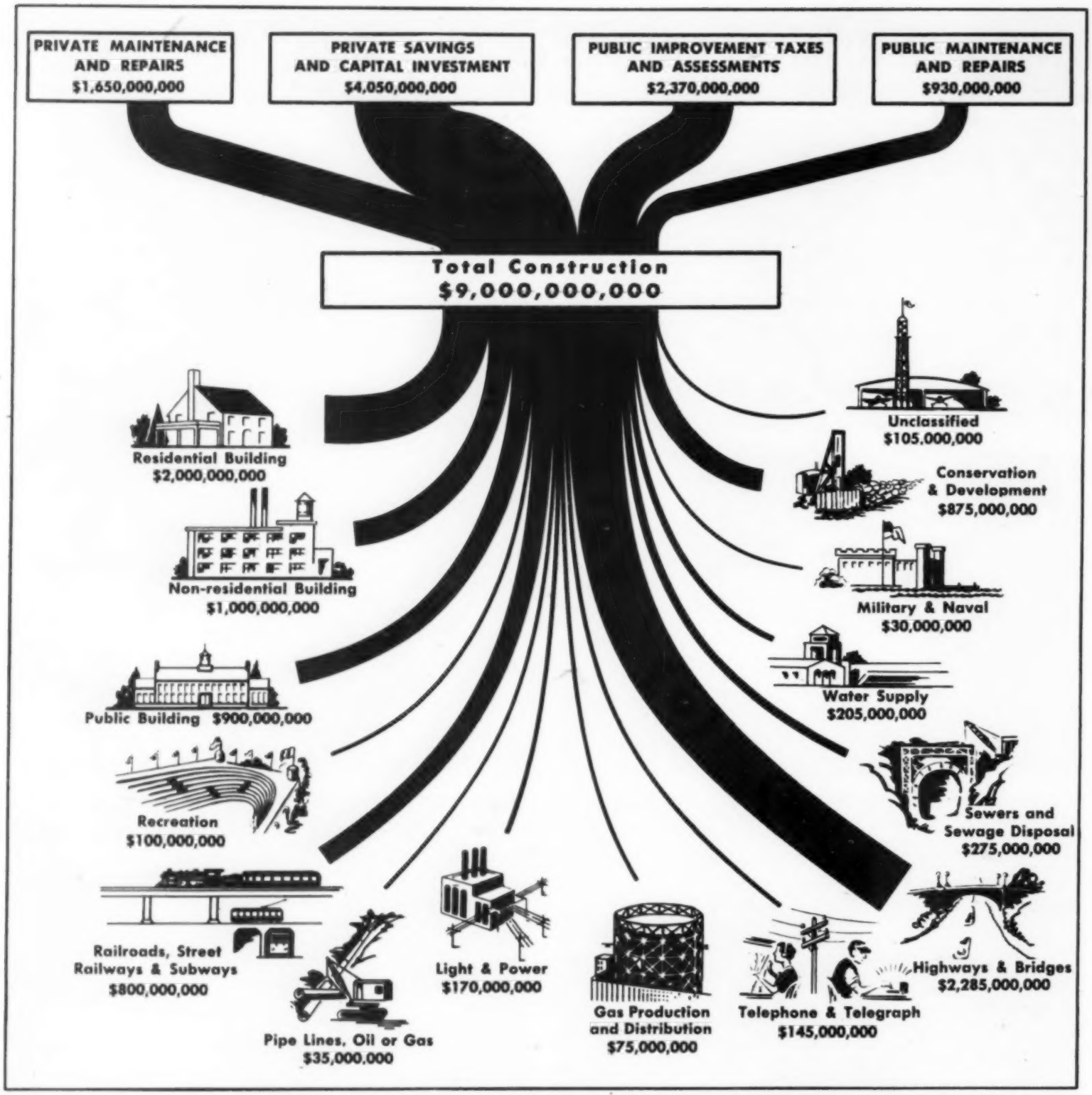
While estimates of the indirect employment furnished by construction vary, a recent analysis, by the U. S. Department of Labor, of P. W. A. construction covering a 4-year period, indicates that "for every hour of labor created on a public works project by a non-federal



CONSTRUCTION in normal years hires more men than any industry except agriculture. In addition, it produces 2.5 man-jobs in transportation, in factory, mine, or forest for every man-job on the construction site.

BUILDING COVERS WIDE RANGE





CONSTRUCTION converts private savings into productive structures and with public savings raises community standards of living. It produces the structures that provide our shelter, transportation, communication, defense, power, light, heat, water, waste disposal, recreation, conservation and development of our national resources.

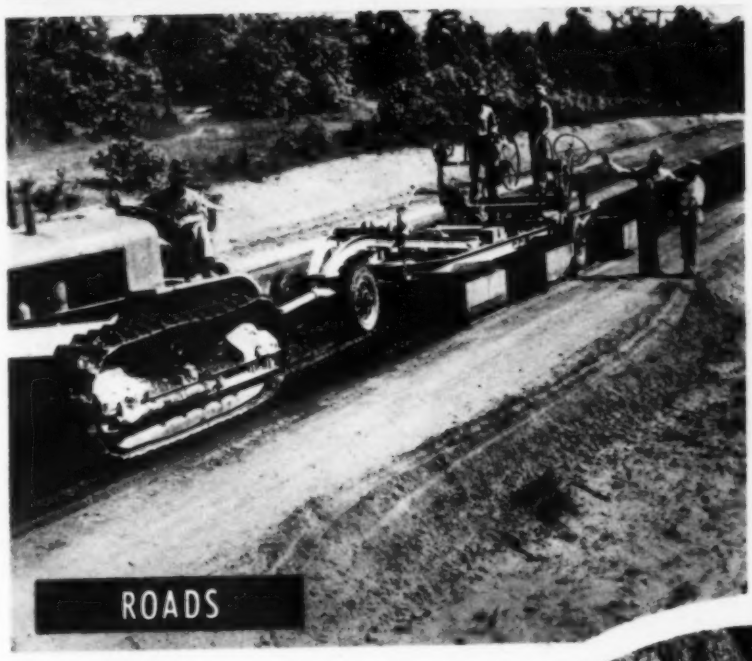
agency 2.5 hours are spent by employees engaged in supplying and transporting the materials for the project." Thus, construction, in its role of employer, serves a two-fold purpose, first by putting men to work directly on the job and, second, by extending its off-the-job influence and buying power into scores of other industries that supply construction with steel, lumber, brick, cement, stone, asphalt, power shovels, tractors, drills, concrete mixers, trucks, and other materials and machinery required to convert the engineer's blueprints into realities in the form of highways, buildings, bridges, dams, or power plants.

CONSTRUCTION'S WIDE RANGE

Construction's wide range of activities, as recently defined in a report by the Department of Commerce, include "the design, production and maintenance of fixed works and structures, such as inclosed space for residential, commercial, governmental, manufacturing and similar purposes; fixed works for transportation and for the storage and transmission of commodities such as water, gas, oil and electrical energy; and substantial changes in the earth's topography."

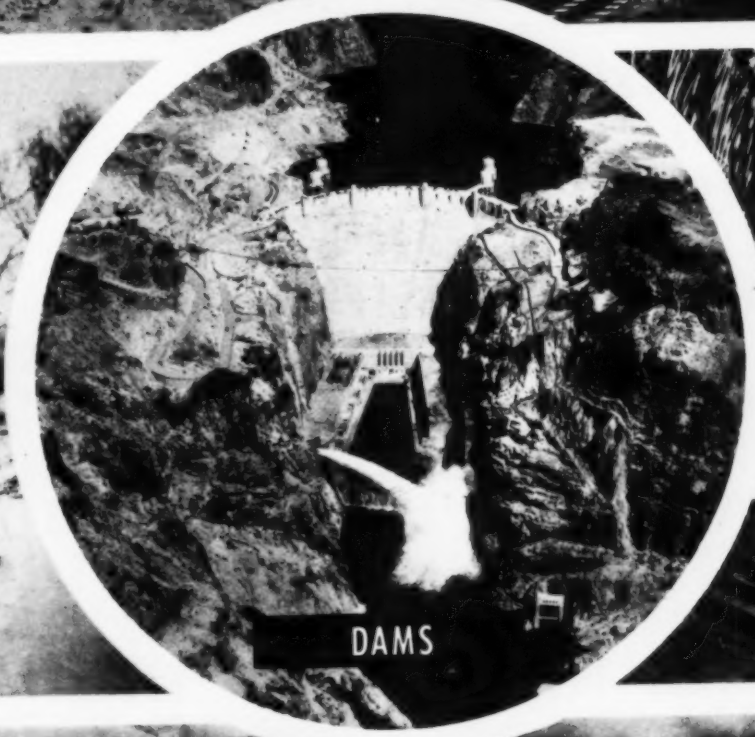
The products of this industry range from the single-family house of John Doe, automobile mechanic, or the

DIVERSITY OF CONSTRUCTION OPERATIONS


ROADS

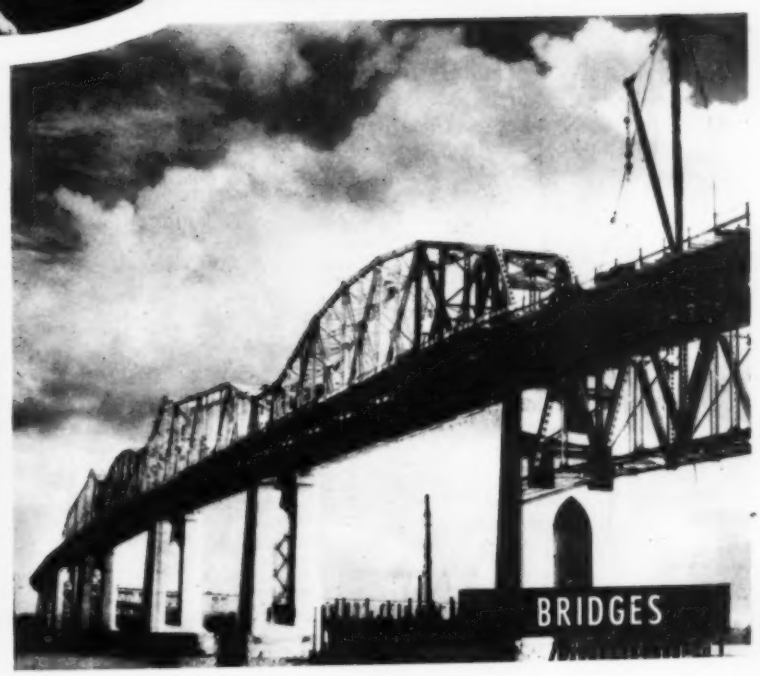

TUNNELS

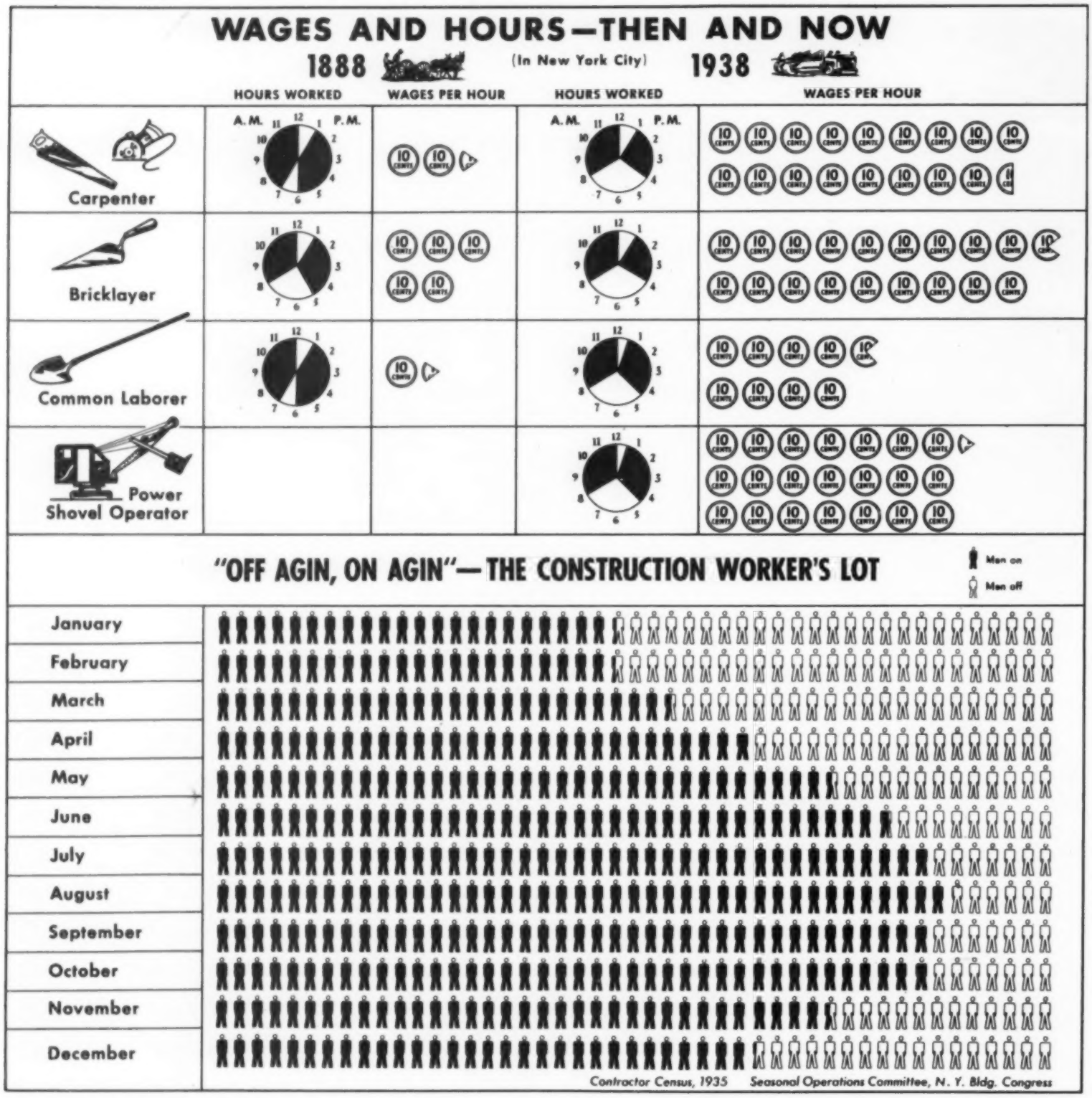

WATER WORKS


DAMS


SEWERS

SUBWAYS


BRIDGES



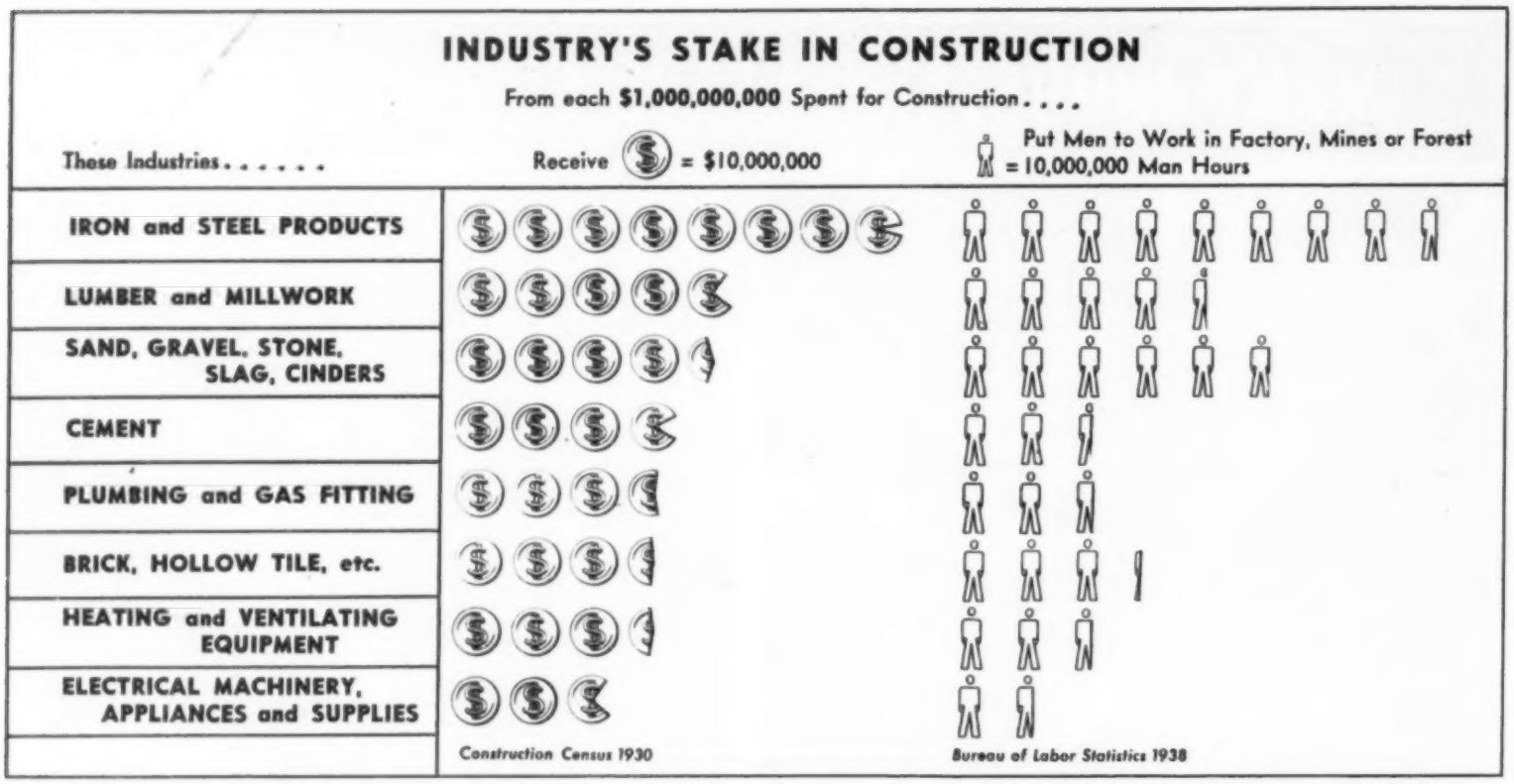
LESS DRUDGERY, with increased personal production, thus higher wages, improve the construction worker's lot today. New tools and machines add variety to skills that further increase opportunities for higher wages. Seasonal employment and gaps between jobs, however, still burden both the construction worker and his industry.

concrete silo for Farmer Brown, to 85-story Empire State buildings, $70,000,000 Boulder dams and 4,200-ft. span Golden Gate bridges. Within these limits occur such projects as water purification and distribution systems, sewers and disposal plants, highways, subways, docks, railroads, canals, irrigation and drainage works, and flood control. In addition to the labor and materials that go into such structures, there are scores of machines permanently installed for the operation of buildings; these include such equipment as elevators, pumps, heating and ventilating equipment, which are generally considered to be integral parts of such structures.

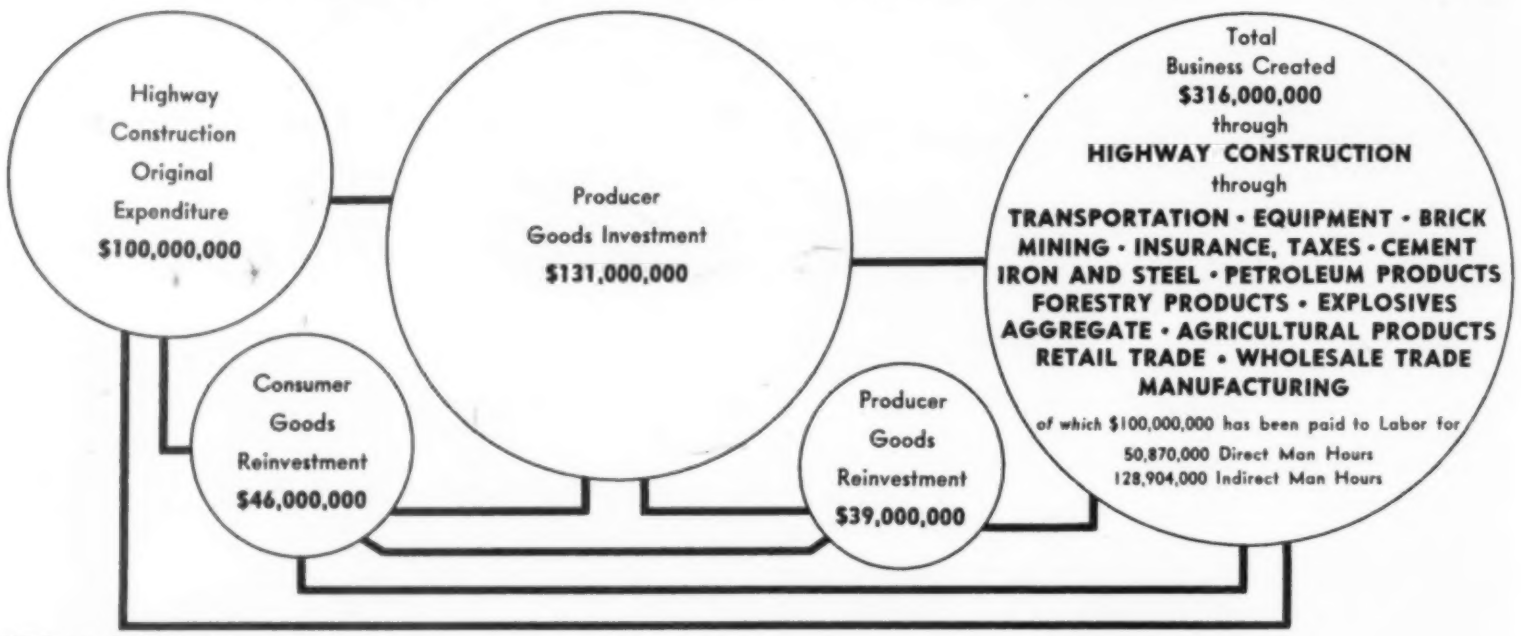
INVESTMENT IN CONSTRUCTION

Just as the steel mill, by processing iron ore, converts a raw product into steel girders or rails, so does the construction industry "process" dollars — capital investment — converting them into useful fixed structures for industrial production or community service. Construction is the nation's No. 1 capital-fixing industry — it takes the savings of our people and of our industries and fixes or converts them into the form of durable works, structures and production facilities that serve modern community life and raise our standard of living. It touches, therefore, a vital spot in our national economy

MANY INDUSTRIES SERVE CONSTRUCTION



EACH $100,000,000 SPENT FOR HIGHWAYS CREATES $316,000,000 BUSINESS TURNOVER



U. S. Bureau of Public Roads

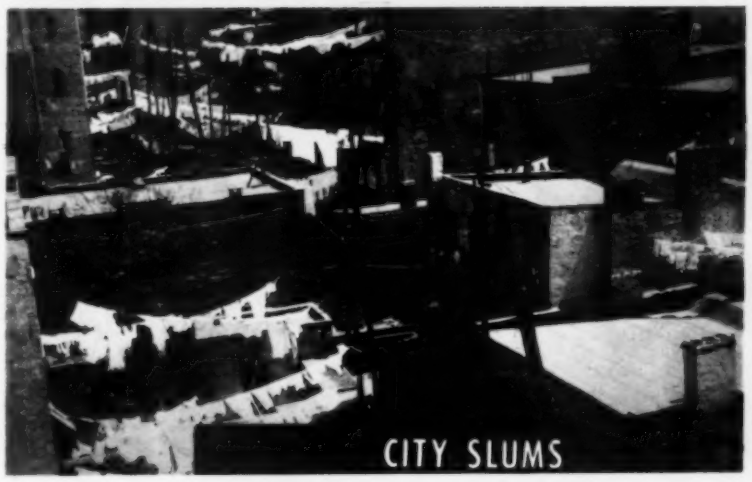
CONSTRUCTION'S HUGE PURCHASES of iron and steel, lumber, cement, sand, gravel, rock, lime, brick, tile, glass, tar, asphalt, paint, machinery, electrical products, mean dollars reinvested in man-hours of labor in transportation, in factory, mine or forest.

and it is of far-reaching importance, also, because it includes within its complete scope hundreds of crafts, professions and tributary industries, involving the products of thousands of factories, the labor of millions of workers, and the funds of millions of investors.

The contribution of construction to the nation's welfare takes the form of durable wealth for both *producer* and *consumer*. To industry, the producer, it supplies the power and the structures needed for the production of goods and the employment of men and women. To the citizen-at-large, the consumer, it gives shelter, means of communication by land and water, buildings for educational, religious or entertainment purposes, water supplies, sanitation and the scores of other facilities that constitute essential elements in American standards of physical well-being.

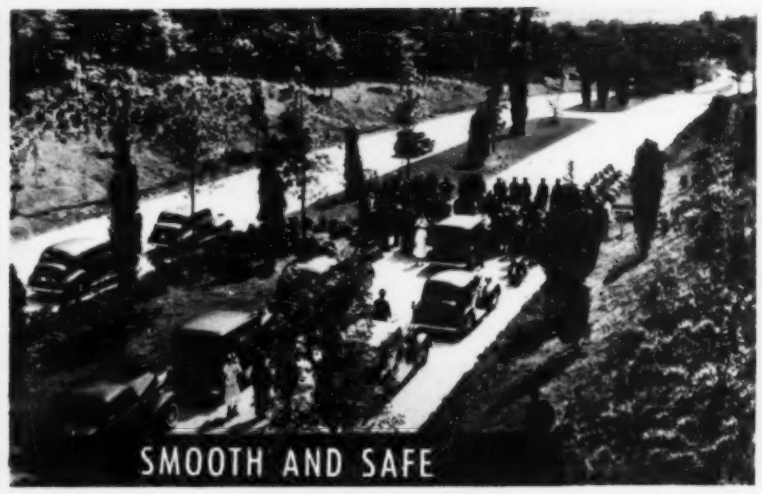
Within the limits of space here available any picture of what the construction industry is, and what it does, must be painted only in the broadest strokes, omitting a mass of facts and figures necessary for a portrait accurate in its detail. The accompanying charts and photographs, therefore, present merely some of the highlights—and shadows—of this second largest American industry and its service to the American people.

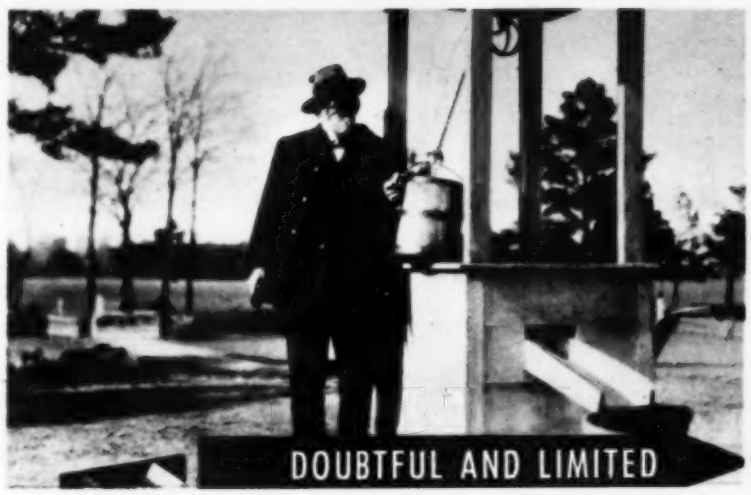
SOCIAL GAINS THROUGH CONSTRUCTION

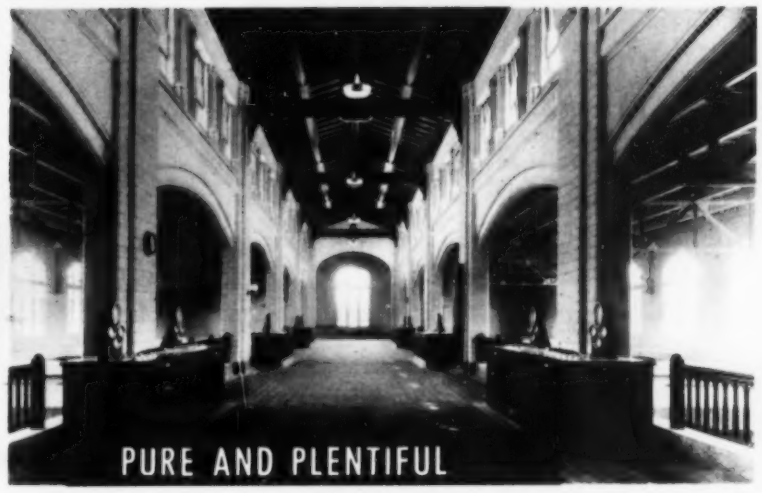

CITY SLUMS


SUNLIGHT AND AIR


MUD AND RUTS


SMOOTH AND SAFE

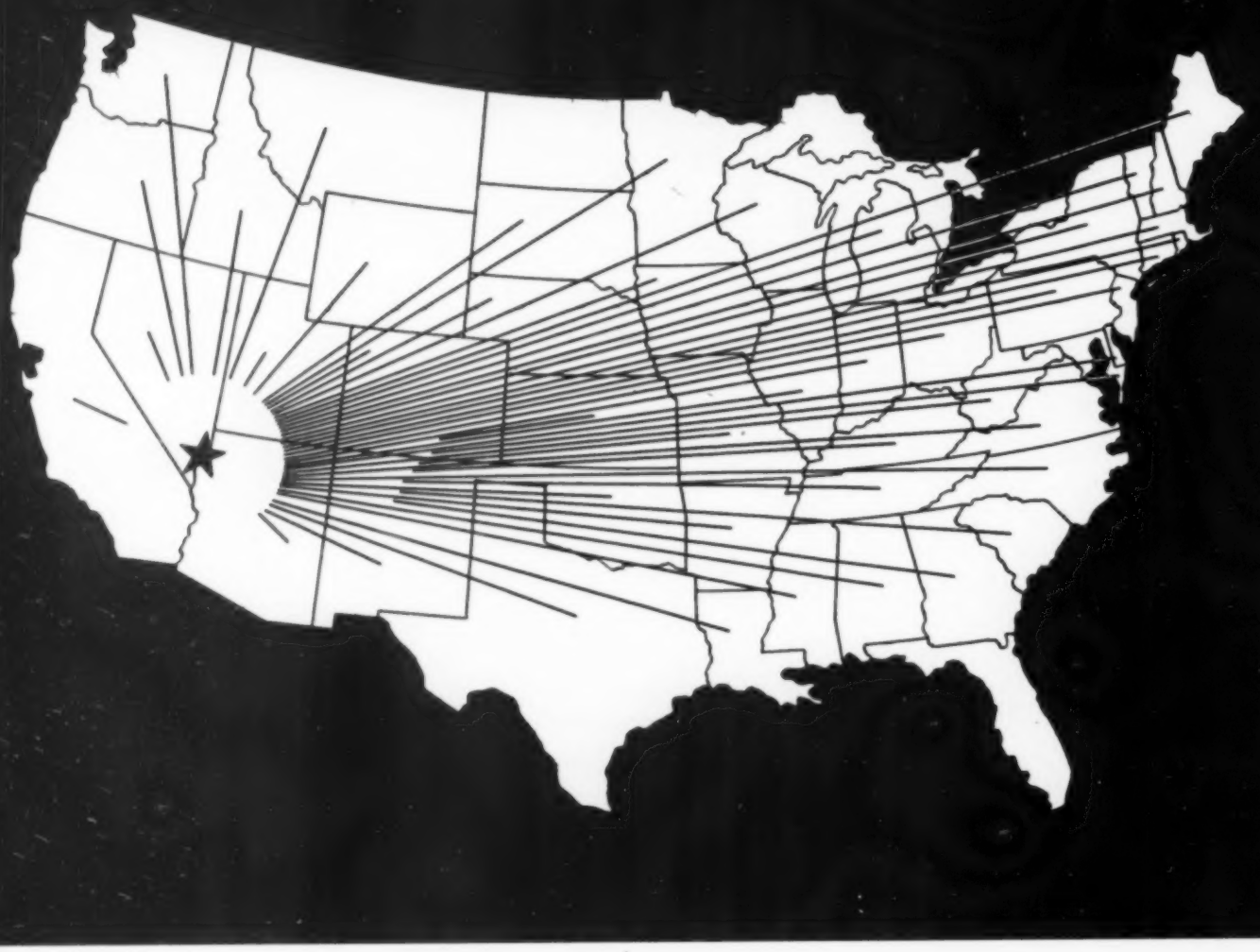

DOUBTFUL AND LIMITED


PURE AND PLENTIFUL


INTERMITTENT AND SLOW


CONTINUOUS AND FAST

CONSTRUCTION BUYS FROM COAST TO COAST



★ Construction purchase orders travel to distant states to fill engineer's specifications and contractor's requirements. At Boulder Dam, for example, materials and equipment for this single job were assembled from 46 states, from Oregon to Maine, from California to Georgia to Massachusetts.

Good Doubters

HELPED US PROVE OUR SPEED-O-MATIC CLAIMS

It is a known fact that the operator's physical capacity limits the yardage handled per day, not the mechanical capacity of the machine. Time studies prove that the Speed-o-Matic enables the operator to get 25% or more yardage than from the same machine with mechanical lever control.

● You may have had your doubts about Link-Belt Speed-o-Matic control when it was first introduced. Good doubters were just what we needed to prove performance claims. Now let's take a look at the records. Read what three different users recently reported.

It will pay you to investigate the profit possibilities of Speed-o-Matic Shovels-Draglines-Cranes. Send for Book No. 1795.

LINK-BELT COMPANY 7429-A

300 W. Pershing Road, Chicago Distributors and Offices in Principal Cities

Average 1808 Yds. in 8 Hours

A. J. Leaf Co., Utica, N. Y. K-45 Speed-o-Matic Shovel, 1½-yd. bucket. 94,000 yds. of fill material moved in 52 working days of 8-hours each, an average of 1808 yds. per day. On the maximum day, a total of 2638 yds. were handled. Unusually severe work.

640 Truck Loads—2 Dippers Each—in 8 Hours

"As a shovel, we loaded 640 Ford trucks with two dippers to every truck, in eight working hours. As a dragline, we are actually doing 1245 passes with a one-quarter swing, with a 2½-yd. Esco bucket and 52-ft. boom, casting the material, in 8 working hours."—R. W. Helmle, M. M., The Utah Constr. Co., Ogden, Utah.

3173 Yds. in 14 Hours

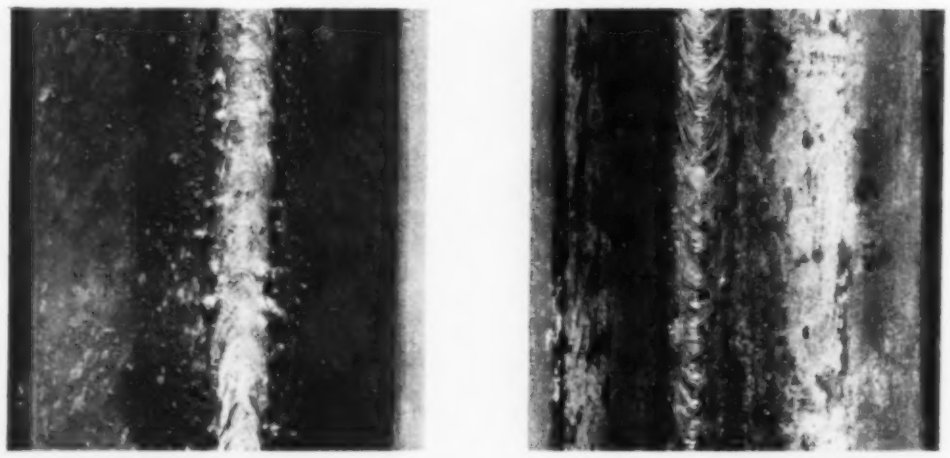
Parlor City Constr. Co., Endicott, N. Y. K-45 Speed-o-Matic Crane at concrete mixing station. Emery Potter, Operator, says, "I went right to work on it without previous experience on a hydraulic machine. It is easier to operate than the best of the lever machines. After a 14-hour day I was not tired, but after a 10-hour day on a lever machine I'd be worn out. A 14-hour, 3173-yd. day was an easy job."

LINK-BELT

Speed-o-Matic SHOVEL

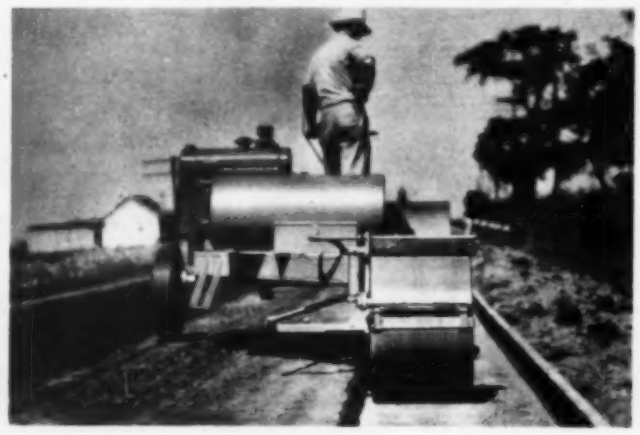
DRAGLINE - CRANE

1½-CU.YD. SHOVEL. convertible to dragline or crane, is equipped with 1½ yd dipper. 21-ft. boom and 17-ft. dipper handle. Shovel boom and dipper handle are of box design, electrically welded throughout. Three levers and two foot pedals control three major operations, hoist, swing and crowd, which are independent of each other making it possible to hoist, travel, swing and crowd and raise or lower boom simultaneously. Hoist clutch vacuum set, operated through toggles. Extra wide, large diameter drums. Solid drum laggings easily changed to fit any line speed. Helical cut gears. Roller bearings. Crawler truck has one-piece base casting with four through axles on ends of which revolve eight open-type self-cleaning rollers. Steering accomplished with upper frame at any position, an advantage when working in close quarters. Crawlers can be extended to increase ground bearing area, without dismantling machine. Cab has in-built winter front of shatter-proof glass and can be opened to give ample ventilation in hot weather. — **Lima Locomotive Works, Inc., Lima, Ohio.**



CLEANING COMPOUND, known as "Spatter Film," said to reduce cleaning time after welding from 20 to 60 per cent, is soluble in water, non-inflammable, and contains no free alkali to injure hands or harm paint. Only enough Film needs to be applied with ordinary paint brush to cover work close to seam or joint. May be readily removed by wiping with clean cloth if still wet, or by washing it off, if dry. Usual cleaning tools, consisting of wire brush, flat sharp chisel or old file, sharpened as chisel, are used. "Spatter Film" sold in quart, gallon and 5-gal. cans, or in 55-gal. drums. Weight, 8¾ lb. per gallon. A gallon will cover approximately 50,000 sq in. of surface — **Lincoln Electric Co., Cleveland, Ohio.**

TRENCH ROLLER designed for use in maintenance and construction of roads. Especially effective on repair, widening, relocation and curve elevation jobs. Weight advantageously distributed offering maximum compression with moderate total weight. Sufficient frame clearance and proper adjustments enable machine to work in depths up to 18 in. and to compact each course from large stone for base to top surface. Two rollers available: one equipped with 10-in. roll weighing 4,900 lb. and one with 20-in. roll weighing 8,300 lb. Powered by four-cylinder completely inclosed gasoline engine. Controls grouped within handy reach of operator are said to be easily operated. Rolls equipped with front and rear spring tensioned scrapers. Large capacity sprinkling tank is provided. Sprinklers equipped with mats for efficient use of water supply. — **Galion Iron Works & Mfg. Co., Columbus, Ohio.**

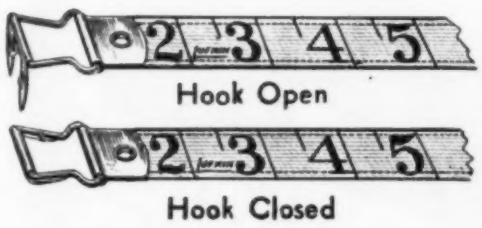


MAINTAINER GRADER, pull-type, hydraulically power-controlled machine, for use with wheel and track-type tractors of medium size has, according to its makers, an entirely new feature — a circle of unique design consisting of two large-diameter con-

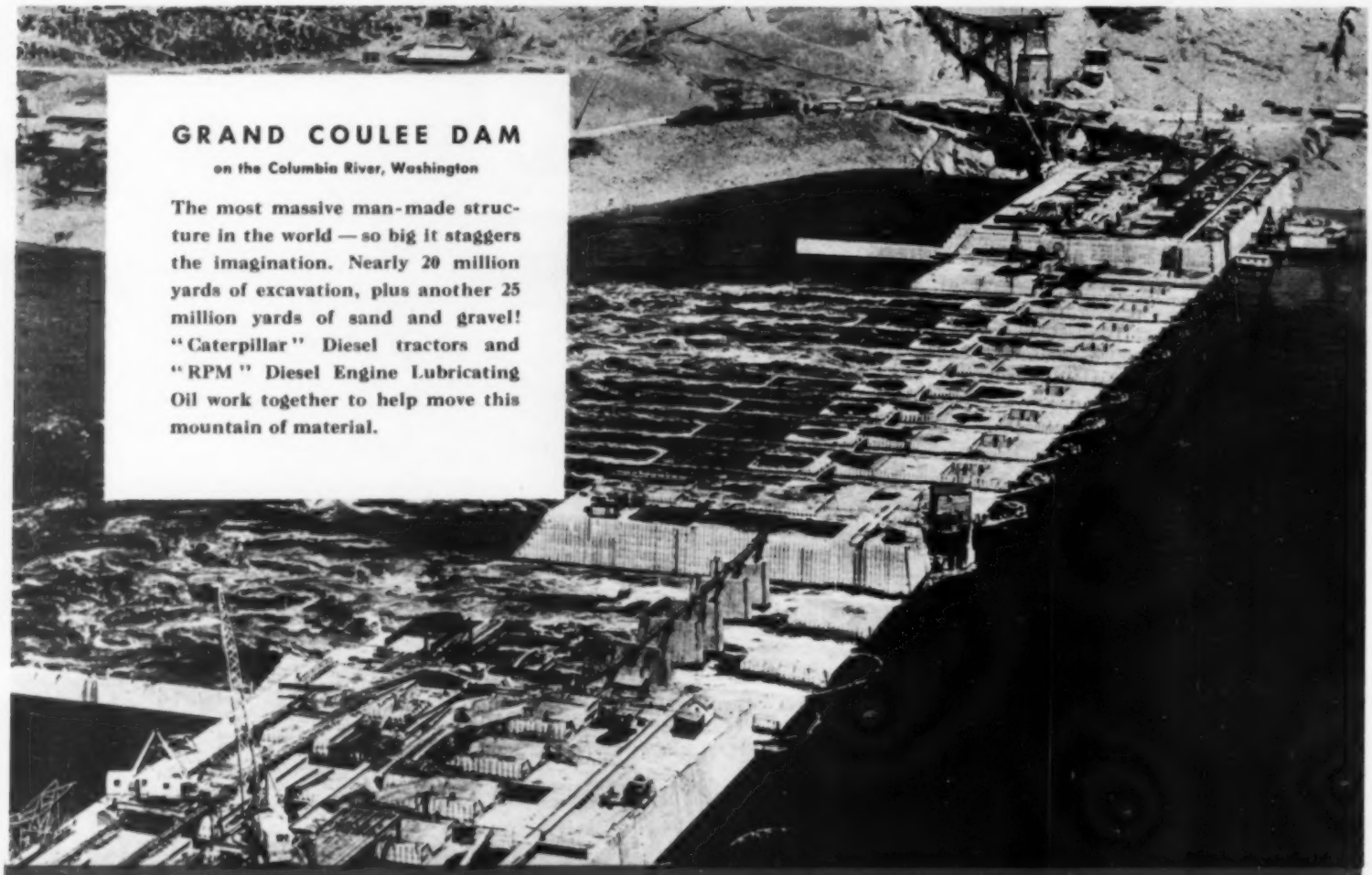
centric circular steel plates flanged and fitted, one inside the other. Larger, outside plate welded to drawbar; smaller turns easily inside larger one, yet is closely fitted and firmly held to prevent chattering. Moldboard attached to heavy steel plates welded to inner circle. This construction said to be exceptionally strong, to do away with chatter and to permit easy adjustment of blade angle. Power-hydraulic system gives instant effortless control over raising, lowering and sideshifting blade and sideshifting grader on rear axle. Control levers located on rear platform. Equipped for one- or two-man operation. — **Good Roads Machinery Corp., Kennett Square, Pa.**

LUMINOUS RING FOR DOOR LOCK to replace metal ring escutcheon commonly used is made of new crystal clear plastic, "Lucite" methyl methacrylate. Advantage of ring is its visibility in dark. It is cast of "Lucite" covering small amount of luminous material in groove on underside. Because of high cost of luminous material, great amount of magnification is required. Magnification is provided by "Lucite" because of its extreme clarity, said to be comparable with optical glass. Plastic also virtually unbreakable. Comes in two standard sizes, can be installed on any door having cylindrical lock and is designed to replace metal ring now in use. — **Manufactured by Elmer E. Mills Corp., Chicago, Ill., for Luminous Processes, Inc., 1 E. 42nd St., New York City. Retailed by Montgomery-Ward stores.**

STEEL HOOK-RING for woven tapes enables one man to take many measurements unassisted. Consists of small, yet sturdy, steel hook permanently affixed to tape ring, not detachable. Holds tape at end of board or pipe, corner of building or other



locations by means of two widely spaced prongs, each with an anchor spur, taking a firm square hold. Spurs grip when tape is under tension, preventing loss of hold or side sway. Tape releases itself when tension is relieved. When not needed, hook folds flat against ring, in no way hindering other uses. Offered on "Metallic," "Junior Metallic" and "Sterling" tapes, bought either with case or as refills, that is, lines only. — **The Lufkin Rule Co., Saginaw, Mich.**



GRAND COULEE DAM

on the Columbia River, Washington

The most massive man-made structure in the world — so big it staggers the imagination. Nearly 20 million yards of excavation, plus another 25 million yards of sand and gravel! "Caterpillar" Diesel tractors and "RPM" Diesel Engine Lubricating Oil work together to help move this mountain of material.

WORLD'S BIGGEST CONSTRUCTION JOBS

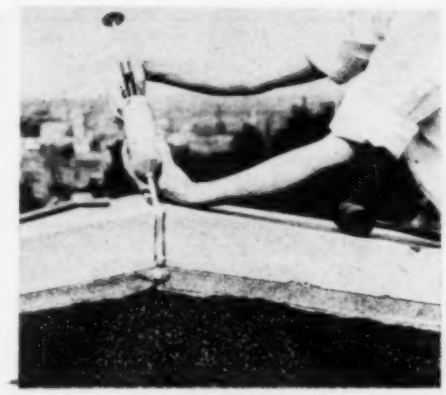
cut costs with "RPM" Diesel Engine Lubricating Oil

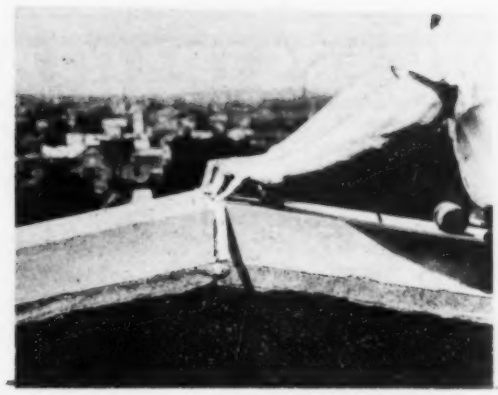
"RPM" Diesel Engine Lubricating Oil is on the job in "Caterpillar" Diesel tractors moving millions of yards of dirt at the Grand Coulee Dam because —

It eliminates carbon troubles —
It prevents ring-sticking —
It lubricates smoothly hour after hour under the toughest working conditions.

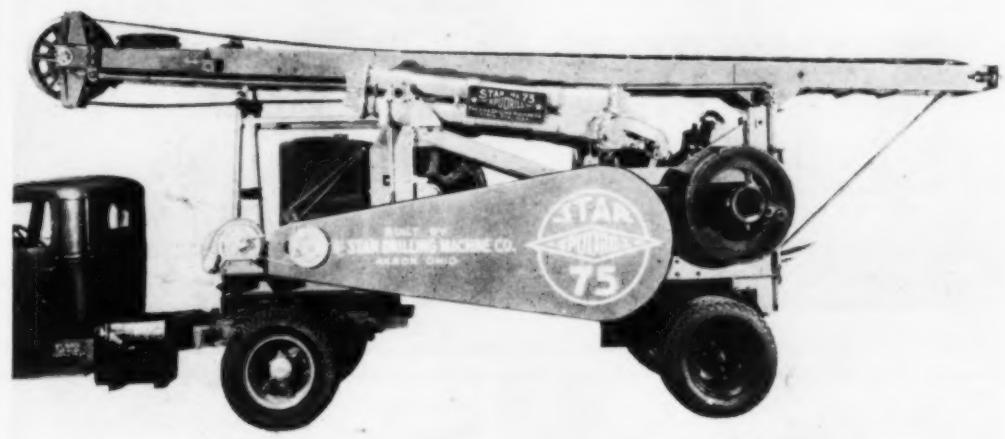
The tractors at this giant dam have operated as long as 10,000 hours between overhauls — an almost unheard-of feat before the discovery of "RPM" Diesel Engine Lubricating Oil. This famous lubricant means money-saving performance for *your* "Caterpillar" Diesel equipment, too. Put it to work — now.

STANDARD OIL COMPANY OF CALIFORNIA





FOR SEALING MASONRY JOINTS. manufacturer recommends patented product, "Weathercap," a pure soft lead strip which, set and bedded in Minwax gray calking compound, forms cap assuring permanent elastic seal. Made in two types: (A) flat cap for use in joints between units set in same plane, (B) 90-deg. cove cap for use in joints between units set approximately at right angles to each other. Cove cap is designed so that tongues will fit into either horizontal or vertical joints. Both types are made in three sizes. After installation of Weathercap its surfaces oxidize rapidly to a dead neutral gray that blends with masonry. Shipped in 6-ft. lengths packed in boxes. Photograph at left shows operation of calking with Minwax calking compound. At right Weathercap is being placed. — **Minwax Company, Inc., 11 West 42nd St., New York City.**



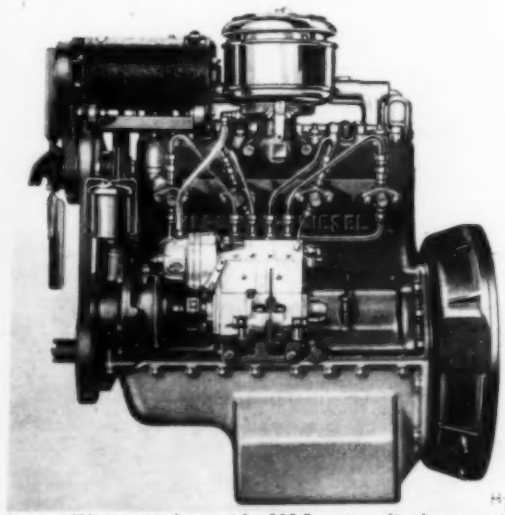
PORTABLE ALL-STEEL DRILLING RIG. designed for economical and efficient drilling and fast movement, called "Spudrill," has 100 per cent anti-friction bearings, free-running reels, air-cooled brakes and shockless spudder. Able to drill to depth of 3,500 ft. Spudder has built into it a shock absorber (for absorbing vibrations caused by drilling operation) without which it would be impossible to make equipment 100 per cent anti-friction bearing. — **Star Drilling Co., Akron, Ohio.**

NEW DUAL-DRUM PAVER (27E) now features hydraulic "fingertip" control of boom swing and discharge chute which eliminates approximately one hundred moving parts, providing better control and faster action. Hydraulically operated boom has swing of 160 deg. and can be swung whether or not mixing drum is revolving — a control feature not possible heretofore. Spring shock absorbers and jaw clutches are eliminated, making it easy to convert standard paver to tower paver. Fingertip control lessens accident risk. Hydraulically controlled discharge chute may be stopped at any point of its travel, and operation may be reversed at will, giving quicker release if aggregates should become jammed, thus eliminating breakage. Other features: (1) Larger, slower-speed engine; (2) positive water control; (3) double-pivoted skip bearing; (4) conical bull wheel — **Ransome Concrete Machinery Co., Dunellen, N. J.**

PORTABLE BELT SANDER, light weight yet sturdy and powerful abrasive machine for sanding and light grinding operations on wood, marble, metal and composition materials, uses endless cloth-backed abrasive 3x24-in. belts of any grit which are

changed instantly by new finger-tip lever arrangement. Provision is made for proper cooling of universal ¾-hp. motor, which drives belt, by front intake slots in frame that permit ample circulation of air for absorption and dissipation of heat. Belt travels 1,350 ft. per minute over flat shoe, assuring ample speed. Shoe pad available for slightly curved surfaces and bench stand holds sander on side for jobs where spindle sander is needed. Streamlined, aluminum frame with cast plastic front and rear handles. Dimensions: 4¾ in. wide by 7½ in. high by 14¾ in. long. Weight, 16 lb. Equipment includes six assorted abrasive belts and 15-ft. rubber-armored cable fitted with proper unbreakable connecting plugs. — **Porter-Cable Machine Co., Syracuse, N. Y.**

FOUR-CYLINDER HIGH-SPEED DIESEL ENGINES, heavy-duty type, for use in smaller size commercial vehicles as well as for industrial and oil field applications. Three models are available: DOOB has 3¾-in. bore, 4½-in. stroke, total piston displacement of 198.8-cu.in. and is rated at 62 hp. DOOC has 4-in.



bore, 4½-in. stroke, with 226.2-cu.in. displacement and is rated at 70 hp. at engine speed of 2,600 r.p.m. DOOD has 4¼-in. bore, 4½-in. stroke, 255.2-cu in. displacement and develops 56.5 hp. at 1,600 r.p.m. As in larger model engines, DOO series features pre-combustion chamber located at side of cylinder bore and designed to insure complete combustion and control of fuel consumption. Forced feed lubrication supplied by geared pump to all bearings, to gear train and to overhead valve mechanism. Available in power unit form, either fully inclosed or in open type of assembly. — **Hercules Motors Corp., Canton, Ohio.**

CHROME LEATHER WELDING HELMET designed for wear in tight places where conventional type of shield requires too much space. Made of selected chrome leather on a specially constructed, fiber headgear. Form-fitting and adjustable to various

head sizes by means of conveniently located screw. Advantages: (1) Easy to locate welding position and to examine progress of work; (2) composition glass holder with clear cover glass flips up instantly for weld inspection obviating need of removing helmet; (3) clear glass on inside protects eyes from foreign particles when wire brushing and cleaning are performed. Particularly useful in general industrial plants for maintenance welding in close quarters. — **Industrial Products Co., 720 W. Somerset St., Philadelphia, Pa.**

LIGHT-WEIGHT JACKHAMMER (less than 35 lb.) for use in coal and metal mines, in quarries and on construction jobs. JA-35 is light enough for cut-

ting hitches, trimming, taking up bottom, placing trolley hangers in a mine and popholing, but is powerful enough for much general work. Improved valve mechanism makes possible faster drilling and lower air consumption. Piston, generously proportioned, has long bearing surfaces and long flutes with large striking area. Rotation effected by rifle bar and ratchet mechanism. — **Ingersoll-Rand Co., 11 Broadway, New York City.**

NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

HAND OPERATED CUTTERS — **H. K. Porter, Inc.,** Everett, Mass. (32 pp., illustrated.) Metal cutting tools in wide range of types and sizes, including bolt cutters, wire cutters, chain cutters, nut splitters, light and heavy pruners and special two-hand tools for industry. Main advantage claimed is leverage principle by which hand power applied at handles is multiplied many fold at cutting edge. Booklet, replete with illustrations of on-the-job applications, is planned to make easy the choosing of the right tool for the work it is to be called upon to do. Tables list complete tools, cutter heads and jaws.

• • •

CORRUGATED STEEL SHEET PILING — **Corrugated Steel Sheet Piling Corp.,** Builders Building, Chicago, Ill. (16 pp., illustrated.) Photographs illustrate application of steel sheet piling on construction of wide range of projects, including sewers, sewage treatment plants, water works, dams, levees, cofferdams, bridge substructures, bulkheads, locks and cutoff walls. Data on section details, including gage, thickness, weight and section modulus. Table shows wall coverage for given number of pieces of piling and number of sheet piles required for cellular cofferdams of various diameters. Sketches illustrate proper methods of setting and driving steel sheet piling and use of piling for soil erosion checkdams, flood control works and dock walls. Salvage value of steel piling for re-use is emphasized and details are given for pulling tongs and driving caps. Other economies due to corrugations of piling are rigidity and strength without unnecessary weight, reflected in freight savings.

• • •

ANCHORS AND ACCESSORIES — **The Rawlplug Co.,** 98 Lafayette St., New York City. (38 pp., illustrated). Catalog entitled "A Better Anchorage for Bolts and Screws," not only pictures and describes many different types of anchors and accessories for use in all kinds of materials but also contains interesting and valuable tables of help to builders with problems of anchoring to masonry.

• • •

HIGHWAY LIGHTING — **Westinghouse Electric & Manufacturing Co.,** Lighting Division, Cleveland, Ohio. (8 pp., illustrated). Booklet gives facts concerning automobile accidents, general information on highway lighting and describes sodium highway luminaires and sodium vapor lamps.

• • •

CEMENT CLEANER — **Magnus Chemical Co.,** Garwood, N. J. Folder of interest to those faced with problem of keeping cement floors, and driveways clean and preserved. Makers recommend their product as being easy to apply, quick working, safe to handle and cheap, and use several job photographs and adequate explanations to emphasize these points.

• • •

BALL AND ROLLER BEARING LUBRICATION — **The Texas Co.,** 135 East 42nd St., New York, N. Y. (42 pp., illustrated.) Advice on the selection of proper greases for anti-friction bearing lubrication and discussion of power consumption developed by certain types of greases. Durability or resistance of greases to breakdown. Chart of ball bearing types. Bearing constructional features. Types of lubricants. Protection of lubrication, including importance of seals, cleaning and flushing, and venting of bearings. Application of lubricants and schedule of lubricants for ball and roller bearings.

Everywhere you go IT'S HEIL DIG-N-CARRY SCRAPERS

Texas 6 cu. yd. Heil Dig-N-Carry operating at Houston brick plant. Heil indicator gauge insures accurate control of cut.

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